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Business Communications Manager
Wireless LAN IP Telephony
Installation and Configuration Guide

NORTEL NETWORKS

North American Regulatory Information

Safety

This equipment meets all applicable requirements of both the CSA C22.2 No.60950 and UL 60950.

The shock hazard symbol within an equilateral triangle is intended to alert personnel to electrical shock hazard or equipment damage. The following precautions should also be observed when installing telephone equipment.

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when working with telephone lines.

Danger: Risk of shock.
Read and follow installation instructions carefully.
Ensure the system and system expansion units are unplugged from the power socket and that any telephone or network cables are unplugged before opening the system or system expansion unit.
If installation of additional hardware and /or servicing is required, disconnect all telephone cable connections prior to unplugging the system equipment.
Ensure the system and system expansion units are plugged into the wall socket using a three-prong power cable before any telephone cables are connected.

Caution: Only qualified persons should service the system.
The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.
Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the system must be connected to an outlet with a third-wire ground. Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (central office lines) removed first.

Enhanced 911 Configuration

Caution: Warning
Local, state and federal requirements for Emergency 911 services support by Customer Premises Equipment vary. Consult your telecommunication service provider regarding compliance with applicable laws and regulations.

Radio-frequency Interference

Warning: Equipment generates RF energy.
This equipment generates, uses, and can radiate radio-frequency energy. If not installed and used in accordance with the installation manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules and with ICES.003, CLASS A Canadian EMI Requirements. Operation of this equipment in a residential area is not permitted and is likely to cause interference.

Repairs to certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician.

Hearing Aid Compatibility

System telephones are hearing-aid compatible, as defined in Section 68.316 of Part 68 FCC Rules.

Repairs

In the event of equipment malfunction, all repairs to certified equipment will be performed by an authorized supplier.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important Safety Instructions

The following safety instructions cover the installation and use of the Product. Read carefully and retain for future reference.

Installation

Warning: To avoid electrical shock hazard to personnel or equipment damage observe the following precautions when installing telephone equipment:

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

   This symbol on the product is used to identify the following important information: Use only with a CSA or UL certified CLASS 2 power supply, as specified in the user guide.

Use

When using your telephone equipment, basic safety precautions should always be followed to reduce risk of fire, electric shock and injury to persons, including the following:

1. Read and understand all instructions.
2. Follow the instructions marked on the product.

3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
4. Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
5. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
6. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
7. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
8. Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
9. Never spill liquid of any kind on the product.
10. To reduce the risk of electric shock do not disassemble this product, but have it sent to a qualified service person when some service or repair work is required.
11. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the power supply cord or plug is damaged or frayed.
    b. If the product has been exposed to rain, water or liquid has been spilled on the product, disconnect and allow the product to dry out to see if it still operates; but do not open up the product.
    c. If the product housing has been damaged.
    d. If the product exhibits a distinct change in performance.
12. Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.
13. Do not use the telephone to report a gas leak in the vicinity of the leak.
14. **Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.
15. Save these instructions.

International Regulatory Information

CE	**The CE Marking on this equipment indicates compliance with the following:** **This device conforms to Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment as adopted by the European Parliament And Of The Council.**	

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Hereby, Nortel Networks declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the European Safety requirements EN 60950 and EMC requirements EN 55022 (Class A) and EN 55024. These EMC limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial and light industrial environment.

WARNING

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. The above warning is inserted for regulatory reasons. If any customer believes that they have an interference problem, either because their Nortel Networks product seems to cause interference or suffers from interference, they should contact their distributor immediately. The distributor will assist with a remedy for any problems and, if necessary, will have full support from Nortel Networks.

Safety

WARNING!

Only qualified service personnel may install this equipment. The instructions in this manual are intended for use by qualified service personnel only.

Only qualified persons should service the system.

The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.

Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the system must be connected to an outlet with a third-wire Earth.

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (exchange lines) removed first.

Limited Warranty

Nortel Networks warrants this product against defects and malfunctions during a one (1) year period from the date of original purchase. If there is a defect or malfunction, Nortel Networks shall, at its option, and as the exclusive remedy, either repair or replace the telephone set at no charge, if returned within the warranty period.

If replacement parts are used in making repairs, these parts may be refurbished, or may contain refurbished materials. If it is necessary to replace the telephone set, it may be replaced with a refurbished telephone of the same design and color. If it should become necessary to repair or replace a defective or malfunctioning telephone set under this warranty, the provisions of this warranty shall apply to the repaired or replaced telephone set until the expiration of ninety (90) days from the date of pick up, or the date of shipment to you, of the repaired or replacement set, or until the end of the original warranty period, whichever is later. Proof of the original purchase date is to be provided with all telephone sets returned for warranty repairs.

Exclusions

Nortel Networks does not warrant its telephone equipment to be compatible with the equipment of any particular telephone company. This warranty does not extend to damage to products resulting from improper installation or operation, alteration, accident, neglect, abuse, misuse, fire or natural causes such as storms or floods, after the telephone is in your possession.

Nortel Networks shall not be liable for any incidental or consequential damages, including, but not limited to, loss, damage or expense directly or indirectly arising from the customers use of or inability to use this telephone, either separately or in combination with other equipment. This paragraph, however, shall not apply to consequential damages for injury to the person in the case of telephones used or bought for use primarily for personal, family or household purposes.

This warranty sets forth the entire liability and obligations of Nortel Networks with respect to breach of warranty, and the warranties set forth or limited herein are the sole warranties and are in lieu of all other warranties, expressed or implied, including warranties or fitness for particular purpose and merchantability.

Warranty Repair Services

Should the set fail during the warranty period:
In North America, please call 1-800-574-1611 for further information.
Outside North America, contact your sales representative for return instructions. You will be responsible for shipping charges, if any. When you return this telephone for warranty service, you must present proof of purchase.

After Warranty Service

Nortel Networks offers ongoing repair and support for this product. This service provides repair or replacement of your Nortel Networks product, at Nortel Networks option, for a fixed charge. You are responsible for all shipping charges. For further information and shipping instructions:
In North America, contact our service information number: 1-800-574-1611.
Outside North America, contact your sales representative.

Repairs to this product may be made only by the manufacturer and its authorized agents, or by others who are legally authorized. This restriction applies during and after the warranty period. Unauthorized repair will void the warranty.

Contents

Figures

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Preface

This section includes the following general information:

Warning: Ensure that you make a complete backup of your data before attempting to upgrade your system. Refer to the upgrade guide that comes with the upgrade package for instructions about upgrading the Business Communications Manager software from one version to another.

Note: Hardware: BCM200 and BCM400 hardware is shipped with 3.0 or newer software, only.

Before you begin

This guide is intended for these audiences:

- the installer who performs the initial configuration of the system
- the operator who manages the overall telephony operations of the system
- the system administrator who manages the data and network operations of the system

This guide assumes the following:

- There is an existing plan outlining the telephony and data requirements for your Business Communications Manager system.
- The Business Communications Manager is installed and initialized, and all hardware appears to be working. External lines and wiring for terminals and sets are connected to the appropriate media bay modules on the Business Communications Manager. All required keycodes have been entered.
- All operators have a working knowledge of the Windows operating system and graphical user interfaces.
- Operators managing the data portion of the system are familiar with network management and applications.

Symbols used in this guide

This guide uses symbols to draw your attention to important information. The following symbols appear in this guide:

Caution: Caution Symbol
Alerts you to conditions where you can damage the equipment.

Danger: Electrical Shock Hazard Symbol
Alerts you to conditions where you can get an electrical shock.

Warning: Warning Symbol
Alerts you to conditions where you can cause the system to fail or work improperly.

Note: Note Symbol
A Note alerts you to important information.

Tip: Tip Symbol
Alerts you to additional information that can help you perform a task.

Security Note: This symbol indicates a point of system security where a default should be changed, or where the administrator needs to make a decision about the level of security required for the system.

Text conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicates that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is: **`ping`** *`<ip_address>`* you enter: **`ping 192.32.10.12`**
`bold Courier text`	Indicates command names and options and text that you need to enter. Example: Use the **`dinfo`** command. Example: Enter **`show ip`** {**`alerts`**|**`routes`**}.
italic text	Indicates book titles

`plain Courier text`	Indicates command syntax and system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`
FEATURE HOLD RELEASE	Indicates that you press the button with the coordinating icon on whichever set you are using.

Nortel Networks WLAN Handsets 2210/2211

Each of the WLAN Handsets 2210/2211 has a user guide that explains the specific feature access for the handsets. Information about using the features of the WLAN Handsets 2210/2211 is contained in the *Nortel Networks WLAN Handset 2210/2211 User Guide*.

In this document, the following handsets are referred to generically as "WLAN handsets":

- Nortel Networks WLAN Handset 2210
- Nortel Networks WLAN Handset 2211

The WLAN Handsets 2210/2211 are very similar. The differences are the following:

- The WLAN Handset 2211 is slightly larger and more rugged than the WLAN IP Handset 2210. It is more suitable in an environment where it might be knocked or bumped (for example, in a warehouse). The WLAN Handset 2210 is sleeker, smaller, and lighter and is more suitable for an office-type environment.
- The WLAN Handset 2211 has a slightly larger battery pack, although the battery life is the same for both models.
- The WLAN Handset 2211 supports the Push-To-Talk (PTT) feature. PTT is not available on the WLAN Handset 2210.
- The WLAN Handset 2210 does not have an adjustable ringer volume.

IP telephones

This document references Nortel Networks IP Phone 2004. The IP Phone 2004 has a user card that explains the buttons on the device, including the `Feature` button, which is a softkey located under the display on the phone. The *Telephone Feature User Guide* can be used with this telephone, as most Business Communications Manager (BCM) features can be accessed from this telephone. The IP Phone 2004 also has a display menu that provides quick access to listed features.

The WLAN Handsets 2210/2211 have a separate feature card that provides a quick reference for accessing the system through the handset. The card also explains how to access the BCM features allowed by the system. Features can be accessed either by entering the code on the dialpad or by using the menu on the handset display.

Information about configuring IP telephones is contained in the *IP Telephony Configuration Guide*.

Acronyms used in this guide

This guide uses the following acronyms:

AAL	Analog Access Lines
ACD	Automated Call Distribution
AH	Authentication Header
ANSI	American National Standards Institute
API	Application Program Interface
ARP	Address Resolution Protocol
ASM	Analog station module
ATA (or ATA2)	Analog Terminal Adapter
AUI	Attachment Unit Interface
AWG	American Wire Gauge
BERT	Bit Error Rate Test
BC	committed burst
BE	excess burst
BIOS	Basic Input Output System
BKI	Break-in
BLF	Busy Lamp Field
BootP	Bootstrap Protocol
BRI	Basic Rate Interface
BRU	Backup and Restore Utility
CAA	Centralized Auto Attendant
CAC	Equal Access Identifier Code (carrier code)
CAP	Central Answering Position (T7316E+KIM or M7324+CAP modules)
CDP	Coordinated Dialing Plan
CHAP	Challenge-Handshake Authentication Protocol
CIC	Carrier Identification Code
CIR	Committed Information Rate
CLID	Calling Line Identification
COPS	Common Open Policy Service
COS	Class of Service
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
CSU	Channel Service Unit

CTE	Connected Telecommunications Equipment
CVM	Centralized Voice Mail
DAL	Digital Access Lines
DASS2	Digital Access Signaling System Number 2
DCE	Data Communications Equipment
DCOM	Distributed Component Object Model
DECT	Digital enhanced cordless telecommunications or Digital European cordless telephone
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol.
DID	Direct Inward Dial
DiffServ	Differentiated Services
DIMM	Dual In-line Memory Module
DISA	Direct Inward System Access
DLCI	Data Link Connection Indentifier
DLCMI	Data Link Control Management Interface
DN	Directory Number
DNS	Domain Name Service (DNS)
DPNSS	Digital Private Network Signalling System
DRT	Delayed Ring Transfer
DSCP	Diff-Serv Code Point
DSP	Digital Signal Processor
DSS	Direct Station Set (also referred to as an auto dial key)
DTE	Data Terminal Equipment
DTM	Digital Trunk Module
DTMF	Dual Tone Multifrequency.
EBN	Egress Border Node
EDO	Extended Data-Out
EF	Expedited Forwarding
eKIM	enhanced Key Indicator Module
EN	Edge Node
ES	End Station
ESP	Encapsulated Security Payload
FDD	Full Double Density
FQDN	Fully Qualified Domain Name

FTP	File Transfer Protocol
GATM	Global Analog Trunk Module
HDLC	High-level Data Link Control
HF	Handsfree
HLC	Home Location Code (UDP dialing)
HS	Hospitality services
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secured
IBN	Ingress Border Node
I/C	Intercom feature button
ICCL	ISDN Call Connection Limitation
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force.
IP	Internet Protocol
IF	Input Filter
IPCP	IP Control Protocol
IPSec	Internet Protocol Security
IPX	Internetwork Packet Exchange
IRQ	Interrupt Request
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISP	Internet Service Provider
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector (formerly CCITT)
IVR	Interactive Voice Response
KIM	Key Indicator Module
LAN	Local Area Network
LCD	Liquid Crystal Display
LCP	Link Control Protocol
LM	LAN Manager
LQR	Link Quality Rate
MAC	Media Access Control
MAU	Media Access Unit
MCDN	Meridian Client Defined Network (PRI SL-1)
MD5	Message Digest algorithm

MLPPP	Multi-Link Point-to-Point Protocol
MPPC	Microsoft Point to Point Compression
MSC	Media Services Card
MS-PEC	Media Services Processor Expansion Card
MWI	Message Waiting Indicator
NAT	Network Address Translation
NBMA	Non Broadcast Multi-Access
NCRI	Network Call Redirection Information
NIC	Network Interface Card
NTLM	NT LAN Manager
NNTP	Network News Transfer Protocol
OPX	Off Premises Extension.
OSI	Open Service Interconnection
OSPF	Open Shortest Path First
PAP	Password Authentication Procedure
PBX	Private Branch Exchange.
PCI	Peripheral Component Interconnect Slot
PDD	Partial Double Density
PDN	Public Data Network
PFS	Perfect Forward Secrecy
PHB	Per Hop Behavior
POF	Packet Output Filter
POP3	Post Office Protocol
PPP	Point-to-Point Protocol
PPPoE	Point-to-Point Protocol over Ethernet
PPTP	Point-to-Point Tunneling Protocol
PRI	Primary Rate Interface
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Circuit
QoS	Quality of Service
QOTD	Quote of the day server
QSIG	Q reference point signalling
RAS	Remote access service
RIP	Routing Information Protocol
RLR	Receive Loudness Rating

RPC	Remote Procedure Call
RTP	Realtime Transport Protocol
SAP	Service Advertising Protocol
SAPS	Station Auxiliary Power Supply
SDRAM	Synchronous Dynamic Random Access Memory
SHA	Secure Hash Algorithm
SLA	Service Level Agreement
SLR	Send Loudness Rating
SMB	Server Message Block
SMDS	Switched Multimegabit Data Service
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SPID	Service Profile Identifier
SR	Static Route
SS	Static Service
SSL	Secure Sockets Layer
STP	Shielded Twisted Pair
SUNNFS	SUN Network File System
TAPI	Telephony Application Program Interface
TCP/IP	Transmission Control Protocol/Internet Protocol
TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
TFTP	Trivial File Transfer Protocol
TOS	Type of Service.
TPE	Twisted Pair Ethernet
TTL	time-to-live
UNISTIM	Unified Networks IP Stimulus
UDP	User Datagram Protocol or Universal Dialing Plan
VLAN	Virtual Local Area Network
VoIP	Voice over IP
VPN	Virtual Private Networks
WAN	Wide Area Network
WFQ	Weighted Fair Queuing
WINS	Windows Internet Name Service

Related publications

In addition to the *Programming Operations Guide*, the Business Communications Manager documentation suite contains the following documents:

- *Management User Guide*
- *Telephony Features Handbook*
- *Installation and Maintenance Guide* (BCM1000 and BCM400/200)
- *IP Telephony Configuration Guide*
- *CallPilot Manager Set Up and Operation Guide*
- *CallPilot Reference Guide*
- *CallPilot Quick Reference Guide*
- *CallPilot Programming Record*
- *CallPilot Message Networking Set Up and Operation Guide*
- *CallPilot Message Networking User Guide*
- *CallPilot Unified Messaging Installation and Maintenance Guide*
- *CallPilot Desktop (Unified) Messaging Quick Reference Guide*
- *Software Keycode Installation Guide*
- *Call Center Set Up and Operation Guide*
- *Call Center Agent Guide*
- *Call Center Supervisor Guide*
- *Call Center Reporting Set Up and Operation Guide*
- *LAN CTE Configuration Guide*
- *Personal Call Manager User Guide*
- *Call Detail Recording System Administrator Guide*
- *Analog Telephone User Guide*
- *CallPilot Fax Set Up and Operation Guide*
- *CallPilot Fax User Guide*
- *Interactive Voice Response Installation and Configuration Guide* (IVR)

From the Business Communications Manager 3.6 Documentation CD, you can also access a number of telephone and accessory quick-reference cards.

If you operate a multi-site BCM network, you can use the Network Configuration Manager to provide centralized configuration and management operations. The documentation for this tool can be found on the Network Configuration Manager CD, which includes the software and the following documentation.

- *Network Configuration Manager Installation Guide*
- *Network Configuration Manager Administration Guide*
- *Network Configuration Manager Client Software User Guide*
- *Network Configuration Manager Reference Guide*

How to get help

If you do not see an appropriate number in this list, go to *www.Nortelnetworks.com/support*.

USA and Canada

Authorized Distributors - ITAS Technical Support

Telephone: 1-800-4NORTEL (1-800-466-7835)
If you already have a PIN Code, you can enter Express Routing Code (ERC) 196#.
If you do not yet have a PIN Code, or for general questions and first line support, you can enter ERC 338#.

Website: http://www.nortelnetworks.com/support

Presales Support (CSAN)

Telephone: 1-800-4NORTEL (1-800-466-7835)
Use Express Routing Code (ERC) 1063#

EMEA (Europe, Middle East, Africa)

Technical Support - CTAS

Telephone:

* European Freephone	00800 800 89009
European Alternative/	
United Kingdom	+44 (0)870-907-9009
Africa	+27-11-808-4000
Israel	800-945-9779

* Note: Calls are not free from all countries in Europe, Middle East or Africa

Fax: 44-191-555-7980

email: emeahelp@nortelnetworks.com

CALA (Caribbean & Latin America)

Technical Support - CTAS

Telephone: 1-954-858-7777

email: csrmgmt@nortelnetworks.com

APAC (Asia Pacific)

Technical Support - CTAS

Telephone: +61-2-870-8800

Fax: +61 388664644

email: asia_support@nortelnetworks.com

In-country toll free numbers

Australia 1800NORTEL (1800-667-835)

China 010-6510-7770

India 011-5154-2210

Indonesia 0018-036-1004

Japan 0120-332-533

Malaysia 1800-805-380

New Zealand 0800-449-716

Philippines 1800-1611-0063

Singapore 800-616-2004

South Korea 0079-8611-2001

Taiwan 0800-810-500

Thailand 001-800-611-3007

Service Business Centre & Pre-Sales Help Desk +61-2-8870-5511

Overview

Description

The Nortel Networks Wireless Local Area Network Handsets 2210 and 2211 (WLAN Handsets 2210/2211) operate over an 802.11b wireless Ethernet LAN providing users a wireless Voice over IP (VoIP). The WLAN Handsets 2210/2211 emulate the Nortel Networks IP Phone 2004 to provide the VoIP functionality.

To be able to connect to the Business Communications Manager (BCM), the WLAN Handsets 2210/2211 must be supplied with the Internet Protocol (IP) address of the Nortel Networks WLAN IP Telephony Manager 2245 and, optionally, a Trivial File Transfer Protocol (TFTP) Server. The WLAN Handsets 2210/2211 accept IP address configuration parameters either from manual configuration or from a Dynamic Host Configuration Protocol (DHCP) Server. DHCP automatic discovery mode provides WLAN IP Telephony Manager 2245 and TFTP Server IP addresses to the WLAN Handsets 2210/2211. In addition, DHCP allows the Unified Manager (UM) and BCM Monitor to recognize the WLAN Handsets 2210/2211 as such. The BCM can be the DHCP Server, or a separate DHCP Server can be installed in the network.

The 802.11b protocol provides no mechanism for differentiating audio packets from data packets. The WLAN IP Telephony Manager 2245 provides a Quality of Service (QOS) mechanism that is implemented in the WLAN Handsets 2210/2211 and the Access Points (APs) to enhance voice quality over the wireless network. The WLAN IP Telephony Manager 2245 gives preference to voice packets over data packets on the wireless medium, increasing the probability that all voice packets are transmitted efficiently and with minimum or no delay.

The WLAN Handsets 2210/2211 use the TFTP Server to update the wireless telephone firmware over the 802.11b WLAN.

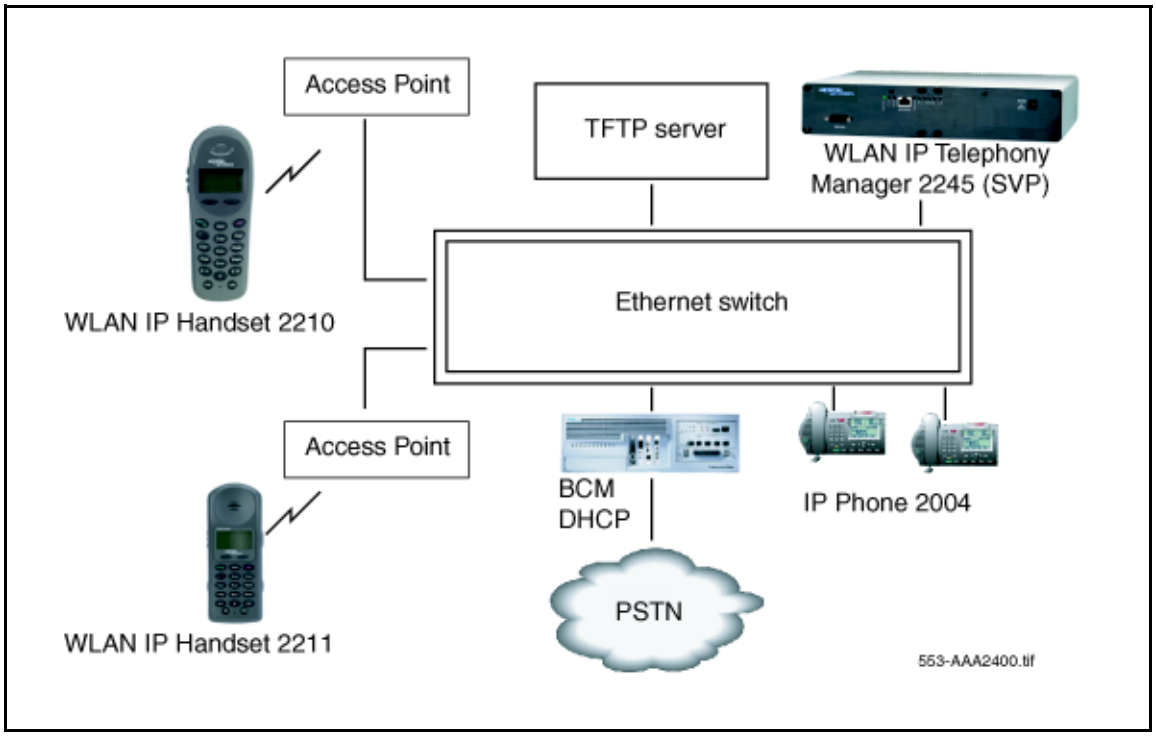
Note: In this document, Nortel Networks WLAN IP Telephony Manager 2245 refers to the SpectraLink Voice Priority (SVP) Server.

Note: For the purposes of this book, it is assumed that site planning and deployment is complete. A general description of the process is provided. This can assist you when troubleshooting. See “Appendix D: Provisioning” on page 113.

Network configuration

There are many possible configurations for a WLAN IP Telephony network. A typical configuration is shown in Figure 1 on page 30.

Figure 1 Basic network configuration



The basic WLAN IP Telephony network consists of the following components:

- BCM (call server)
- TFTP Server (optional)
- DHCP Server (optional)
- WLAN IP Telephony Manager 2245
- WLAN Handset 2210/2211
- Access Point (AP)

BCM

To support the WLAN Handsets 2210/2211, the BCM system must run Release 3.6.1 (patch) or later software versions. BCM systems with 3.6 or earlier software versions must be upgraded to support the handsets.

TFTP Server

A TFTP Server distributes firmware to the WLAN Handsets 2210/2211 and WLAN IP Telephony Manager 2245. It can reside on a different subnet than the BCM and APs. The TFTP Server can be located on either side of the firewall.

If too many wireless handsets are attempting to download new firmware simultaneously, the downloads can slow down or error messages can be returned. To reduce the number of retries and error messages, manage the download process by staggering the times the wireless handsets download the firmware.

The TFTP Server must be capable of supporting multiple TFTP sessions.

Nortel Networks has tested the following TFTP Servers. They are listed in order of preference.

- Nortel Networks TFTP Server (Optical Network Management System [ONMS] application)
- 3COM TFTP
- PumpkinTFTP
- SolarWinds TFTP

WLAN Handset 2210/2211 firmware upgrade

Assuming the IP address of the TFTP Server has been configured on the WLAN Handsets 2210/2211, each time a WLAN handset is powered on, the following occurs:

1. The WLAN handset checks its version of firmware against the firmware on the TFTP Server, which takes less than two seconds on a quiet network.
2. If the firmware versions are different, the WLAN handset downloads the new firmware from the TFTP Server. This process takes about 30 seconds.
3. If the TFTP Server is offline or unreachable, the WLAN handset tries for about ten seconds before giving up and using its existing version of firmware.

DHCP Server

For detailed DHCP Server instructions, refer to the *Configuring DHCP* chapter of the *Programming Operations Guide (N0008589)*.

DHCP is a standardized protocol that enables clients to be dynamically assigned with various configuration parameters, such as:

- IP address
- subnet mask
- default Gateway
- other critical network configuration information

DHCP Servers centrally manage such configuration data, and are configured by network administrators with settings that are appropriate for a given network environment.

The IP-related parameters of the WLAN Handsets 2210/2211 can be configured manually or through a DHCP Server (RFC 1541 and RFC 1533). The DHCP Server can be on either side of the firewall, according to the site administrator's preference. The DHCP Server is optional if the WLAN handsets and WLAN IP Telephony Manager 2245 are statically configured.

Each wireless handset effectively uses two IP addresses in the wireless subnet. One is for the physical set, and one is the second alias IP address that is used on the WLAN IP Telephony Manager 2245 Server. A contiguous block of addresses, equal to the number of handsets supported, must be marked as unavailable for distribution when you allocate addresses in a subnet scope on the DHCP Server.

The DHCP Server can require specific configuration modifications when multiple WLANs are connected to a single Wireless Security Switch (WSS). Refer to the documentation that accompanies the specific WSS being used for any special DHCP configuration requirements.

The WLAN handset searches for server configuration in the options listed in Table 1. The wireless handset uses the DHCP options listed when DHCP use is enabled.

Table 1 DHCP options

Option	Meaning
1	Subnet mask
3	Default Gateway
6	DNS Server
15	Domain name
66	TFTP Server
128	Site specific
151	WLAN IP Telephony Manager 2245
191	Site specific
siaddr	Boot server or next server

When the patch is applied to Release 3.6, or when Release 3.7 or later is running, two new fields appear under Global options:

- DHCP Option 66 - This can be used to specify the address of the TFTP Server. If this Option is not present the phone will look at the Next server/ Boot server (siaddr) option for the address of the TFTP server.
- Vendor Specific Option 43, 128, 144, 157, 191, or 251 - Only one of these options is required. The DHCP Server encodes the Server 1 information using the same format as the IP Phone 2004. If the Server 2 information is also present in the option, it is ignored.
- DHCP Option 151 - This option contains the IP address of the WLAN IP Telephony Manager 2245. If Option 151 is not configured, the wireless handset performs a Domain Name Service (DNS) lookup of the name "SLNKSVP2", if Options 6 (DNS Server) and 15 (Domain Name) are configured.

Firewall

In many installations there will be a firewall installed between the wired and wireless parts of the network. It is beyond the scope of this document to specify how a firewall is managed, but the following guidelines can be used when configuring firewalls:

- The TFTP Server, DHCP Server, and Syslog Server can be anywhere in the network (that is, they are not restricted to being in the same subnet as the handsets and WLAN IP Telephony Manager 2245). From an administrative point of view, it may be more convenient to place these components in the wired portion of the network. If a firewall is between the WLAN Handsets 2210/2211, and the WLAN IP Telephony Manager 2245 and the servers, the firewall will need to be configured to allow the TFTP (User Datagram Protocol [UDP] port 69 - bidirectional) and Syslog traffic (UDP port 514 - unidirectional) and a DHCP relay agent.
- When the WLAN Handsets 2210/2211 are hosted by a BCM, the following port numbers are used:
  - UNIStim signaling uses UDP port 7000
  - Media to and from the handset uses UDP ports 51000–51200.

Note: The media ports are configurable. The values shown above are the default values.

- If other Nortel call servers are used in the network (for example, BCM, MCS5100, CS2100), the system administrator will need to determine which UDP ports are used for Realtime Transport Protocol (RTP) and RTCP and make the appropriate provisions in the firewall.
- If third party gateways are configured in the system, the system administrator will need to determine which UDP ports are used for RTP and RTCP and make the appropriate provisions in the firewall.
- All media and signaling goes through the WLAN IP Telephony Managers 2245 (that is, it will all originate from one, or a few, Media Access Control [MAC] addresses). If the firewall is capable of filtering based on MAC address, the administrator can create a simple access control filter based on a small number of MAC addresses.

Note: For IP Telephony firewall information, refer to the *Optional VoIP trunk configurations* chapter in the *20XX IP Telephony Configuration Guide (N0008591)*. Also refer to the *Configuring IP Firewall Filters* chapter of the *Programming Operations Guide (N0008589)*.

WLAN IP Telephony Manager 2245

The WLAN IP Telephony Manager 2245, also referred to as SVP II Server, is a device that manages IP telephony network traffic on the WLAN IP Telephony system. It is required in order to use the 11Mbit/s maximum transmission speed available in the WLAN Handsets 2210/2211. The WLAN IP Telephony Manager 2245 acts as a proxy for the WLAN handsets. It provides a number of services including a Quality of Service (QoS) mechanism, AP bandwidth management, and efficient Radio Frequency (RF) link use.

The WLAN IP Telephony Manager 2245 works with the APs to provide QoS on the WLAN. All voice packets are encapsulated by the WLAN handsets. The encapsulated voice packets to and from the WLAN handsets are handled by the WLAN IP Telephony Manager 2245 and routed to and from the BCM.

SVP is the QoS mechanism implemented on the WLAN handsets and APs to enhance voice quality over the wireless network. SVP gives preference to voice packets over data packets on the wireless medium, increasing the probability that all voice packets are transmitted with minimum delay. SVP is fully compliant with the IEEE 802.11 and 802.11b standards.

Each subnet where the WLAN handsets operate requires at least one WLAN IP Telephony Manager 2245. One unit can process 90 simultaneous calls. If greater capacity is required, multiple units can be used in a master-slave arrangement.

Note: The WLAN Handset 2211 uses IP multicast addresses for the Push-To-Talk (PTT) feature. This requires that multicasting be enabled on the subnet used for the WLAN Handset 2211 and the WLAN IP Telephony Manager 2245. Refer to the *Nortel Networks WLAN Handset 2210/2211 User Guide* for more information on the PTT feature.

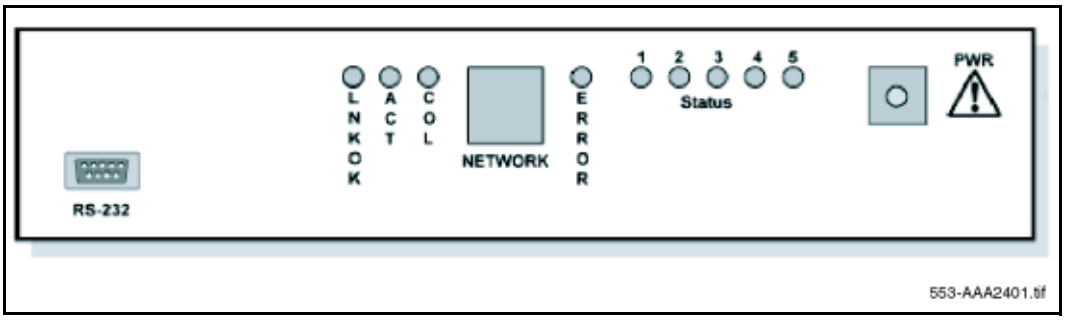
Physical description

The front panel of the WLAN IP Telephony Manager 2245 contains ports to connect to the following:

- power
- LAN
- administrative computer through an RS-232 port

Status LEDs supply information about the status and activity of the WLAN IP Telephony Manager 2245. See Figure 2.

Figure 2 WLAN IP Telephony Manager 2245 front panel



- **RS-232** ports - the male DB-9 connector (DTE). Provides an RS-232 connection to a terminal, terminal emulator, or modem for system administration.
- Link LEDs
  - **LNKOK** - lit when there is a network connection
  - **ACT** - lit when there is system activity

  - **COL** - lit if there are network collisions
- **NETWORK** - connects the WLAN IP Telephony Manager 2245 to the wired Ethernet LAN
- **ERROR** LED - lit when the system has detected an error
- **Status** LED - indicate system error messages and status
  - **1** - heartbeat
  - **2** - active calls
  - **3, 4, 5** - currently unused
- **PWR** - connects to the AC adapter supplying power to the system

Warning: Use only the provided Class II AC adapter with 24 volt (V) DC, 1 amp (A) output.

Functional description

The WLAN IP Telephony Manager 2245 provides the following services to the WLAN Handsets 2210/2211:

- It acts as a proxy for every WLAN handset; that is, all Unified Networks IP Stimulus (UNIStim) signaling and RTP media to and from the wireless handset pass through the WLAN IP Telephony Manager 2245. Except for the initial DHCP and TFTP sessions, the wireless handsets only communicate with the WLAN IP Telephony Manager 2245.

  Each WLAN IP Telephony Manager 2245 is configured with an IP address with which all of the wireless handsets communicate. In addition, each WLAN IP Telephony Manager 2245 is configured with a pool of IP addresses. When a wireless handset registers with a WLAN IP Telephony Manager 2245, the wireless handset is assigned one of the IP addresses from the pool. All communication between this WLAN IP Telephony Manager 2245 and other devices (BCM, IP Phones, gateways, and other wireless handsets) is always done through its pool of IP addresses. In this sense, the WLAN IP Telephony Manager 2245 acts as a Network Address Translation (NAT).

  The WLAN IP Telephony Manager 2245 has a single physical Ethernet interface and MAC address. Therefore, all of the IP addresses are mapped to a single MAC address.

- The WLAN IP Telephony Manager 2245 tags and untags packets with the SVP header. SVP packets have the protocol byte of the IP header set to 0x77. SVP-compliant APs use this proprietary tagging to give priority to tagged packets. For UDP (UNIStim and RTP) packets going from the wireless handset to the network, the WLAN IP Telephony Manager 2245 replaces the SVP protocol number, 0x77, with the UDP number, 0x11. For packets going from the network to the wireless handset, the protocol number is changed from 0x11 to 0x77.

  There can be no Layer 3 routing in the path because packets that traverse the network between the wireless handset and the WLAN IP Telephony Manager 2245 are not standard IP packets (the packets use a non-standard protocol number). Therefore, the wireless handsets and WLAN IP Telephony Managers 2245 must be in the same logical subnet.

- RTP packets between the wireless telephone and the WLAN IP Telephony Manager 2245 always contain 30 milliseconds (ms) worth of voice, regardless of what has been configured on the BCM. The WLAN IP Telephony Manager 2245 repackages the RTP packets to conform to the size that has been configured in the BCM. This provides more efficient use of the available RF bandwidth at the expense of slightly increased jitter and latency.
- The WLAN IP Telephony Manager 2245 is configured with a maximum allowable number of simultaneous media streams on a single AP. The WLAN IP Telephony Manager 2245 keeps track of the number of media streams on each AP and blocks calls to and from a wireless handset that would exceed the configured capacity.
- There is a keep-alive packet exchange that runs between the wireless handset and the WLAN IP Telephony Manager 2245 every 30 seconds. If the wireless handset detects the WLAN IP Telephony Manager 2245 is unreachable, the wireless handset resets itself and attempts to re-establish a connection with the master WLAN IP Telephony Manager 2245, where there is more than one WLAN IP Telephony 2245 in the system.

Capacities

The WLAN IP Telephony Manager 2245 requires a CAT5 cable connection between its network port and the Ethernet switch. The WLAN IP Telephony Manager 2245 auto-negotiates to the type of port on the Ethernet switch and supports 10BaseT, 100BaseT, full-duplex, and half-duplex port types.

In any subnet where wireless handsets are used, each subnet must have one or more WLAN IP Telephony Managers 2245. A WLAN IP Telephony Manager 2245 group on a subnet consists of one or more WLAN IP Telephony Managers 2245 and their associated wireless handsets. Only one master WLAN IP Telephony Manager 2245 can be on a subnet.

The WLAN infrastructure, if properly deployed, can support the same capacity offered in the BCM for IP terminals. When planning for WLAN set deployment, follow standard BCM IP terminal engineering practices. When planning your WLAN infrastructure deployment, follow your AP vendor’s standard voice deployment site survey practices.

WLAN IP Telephony Manager 2245 firmware upgrade

When a WLAN IP Telephony Manager 2245 reboots or is manually reset by the operator, the following occurs:

1. The WLAN IP Telephony Manager 2245 checks its version of firmware against the version on the TFTP Server.
2. If the firmware versions are different, the WLAN IP Telephony Manager 2245 downloads the new firmware.

Feature Packaging/Set Emulation Model, IT Type and Release Number

The WLAN Handsets 2210/2211 appear to the BCM as a standard IP Phone 2004.

The WLAN Handsets 2210/2211 have the following assignments:

- IT TYPE: 0x02
- Release Number 2210: 0x06
- Release Number 2211: 0x07
- Manufacturing ID: 30
- Color Code: 66
- DHCP Class Identifier: "Nortel-i2210-A" or "Nortel-i2211-A"
- PEC Code: NTTQ4010 for the 2210 and NTTQ5010 for the 2211

Roaming and handover

Roaming is the ability of the wireless handset to go anywhere in the WLAN Extended Service Set (ESS) RF signal coverage area and to make and receive calls. Handover is the ability of the wireless handset to maintain an active call without interruption while moving within a WLAN ESS RF signal coverage area. This means that the wireless handset hands over the WLAN RF signal from AP to AP without interrupting the data stream.

APs on the same subnet

The WLAN Handsets 2210/2211 can perform handover and roaming across SVP-compliant APs that reside on the same subnet as the wireless handset and WLAN IP Telephony Manager 2245 group. Refer to Table 8 on page 77 for a list of SVP-compliant APs.

APs on different subnets using WSS

If you use Nortel Networks WSS 2250/2270 and Nortel Networks Access Ports 2230, both operating in Layer 3 mode, the WLAN Handsets 2210/2211 can perform roaming and handover across Access Ports 2230 on different subnets. The WSS 2270 operating in Layer 3 mode is on the same subnet as the WLAN IP Telephony Manager 2245 group. The WSS 2270 allows the wireless handset to retain its original IP address, whether the IP address was configured statically or obtained by DHCP. This means that roaming and handover can occur across Access Ports 2230 placed on any subnet.

Note: The WSS 2270 must be running version 2.0.71.0 (or later) software.

Mobility across different subnets when using DHCP

If a WSS is not in use, and the IP address of the wireless handset has been acquired through DHCP, the wireless handset must be powered down and powered up when entering a new subnet. This enables functionality of the wireless handset when entering the WLAN RF signal coverage area of a different WLAN IP Telephony Manager 2245 group on a different subnet. Normal functionality returns once the wireless handset:

- establishes communication within the Extended Service Set ID (ESSID) of the new WLAN
- obtains another IP address from the DHCP Server
- checks in with the group master

If the wireless handset is configured to use the ESSID of the new WLAN, it automatically discovers the ESSID of the APs operating in broadcast mode.

Table 2 summarizes the roaming and handover capabilities.

Table 2 Roaming and handover capabilities summary

IP address	WSS in use	Roaming capability	Handover capability
Static	No	No	No
Static	Yes	Yes	Yes
DHCP	No	Yes, if the wireless handset is power-cycled between subnets.	No
DHCP	Yes	Yes	Yes

Access Point

The 802.11b APs provide the connection between the wired Ethernet LAN and the wireless (802.11) LAN. APs work in all markets and must be positioned in all areas where the WLAN handsets are used. The number and placement of APs affects the coverage area and capacity of the WLAN IP Telephony system. Typically, the requirements for use of WLAN Handsets 2210/2211 are similar to those of other wireless data devices.

The APs must be SVP-compliant to support QoS. For a list of supported APs, refer to Appendix A: Compatible Access Points on page 77.

When a user on an active call is moving about, the call switches from one AP to another in the subnet. This changeover is transparent to the user.

It is essential to know where to install the APs to provide effective coverage for the WLAN handsets. The first step is to define exactly where the coverage is needed, which requires a site survey. Refer to "Appendix D: Provisioning" on page 113 for information on site planning.

Tips: A site survey must be performed before installing a wireless LAN. Nortel Networks also recommends a site survey when an existing network structure is modified or when physical changes are made to a site.
Nortel Networks recommends the use of the Nortel Networks Site Survey Tool to perform the site survey.

Network planning

.It is necessary to ensure that all connections and interfaces for the IP Telephony network be configured as full-duplex. Duplex mismatches anywhere on the WLAN can cause the wireless IP Telephony system not to function normally.

IP address planning

The WLAN IP Telephony Manager 2245, the optional WLAN Application Gateway 2246, and each of the wireless handsets and APs associated with them, requires an IP address.

Note: The master WLAN IP Telephony Manager 2245 must have an IP address statically configured. If using DHCP for the rest of the network, the DHCP Server must have the static IP address of the master WLAN IP Telephony Manager 2245 configured on it. If using DNS, the DNS Server must have the static IP address of the master WLAN IP Telephony Manager 2245 configured on it.

The wireless handsets can be configured to use DHCP or can be assigned a static IP address. If there is no DHCP Server, the system administrator must determine what IP addresses are to be used for static addressing. As well, whether static IP addressing or DHCP is used, a pool of alias IP addresses must be configured on the WLAN IP Telephony Manager for the use of the wireless handsets. Ensure that the pool of alias IP addresses is reserved exclusively for the use of the wireless handsets.

Refer to WLAN IP Telephony Manager 2245 configuration on page 45 for information on configuring a static IP address on a WLAN IP Telephony Manager 2245. Refer to "Configuring the network" on page 48 for information on configuring a static IP address for a WLAN Application Gateway 2246. Refer to IP Address menu on page 63 for information on configuring a static IP address on the WLAN Handsets 2210/2211. Refer to the vendor-specific documentation for information on assigning IP addresses to the APs.

Tip: Record the static IP address assignments and store them in a safe place.

IP addressing with DHCP

A pool of alias IP addresses must be configured on the WLAN IP Telephony Manager 2245 for the use of the wireless handsets. Refer to "Functional description" on page 35 for information on IP addresses on the WLAN IP Telephony Manager 2245.

The use of a 22-bit subnet mask provides IP addresses for approximately 500 wireless handsets (1024 nodes). Allocate a pool of an equal number of IP addresses on the DHCP Server and WLAN IP Telephony Manager 2245 for the wireless handsets.

For example:

142.223.204.1 to 142.223.205.254 are allocated on the DHCP Server for the use of the wireless handsets.

142.223.206.1 to 142.223.207.254 are configured on the WLAN IP Telephony Manager for IP aliases for the wireless handsets.

Ensure that all these IP addresses are reserved on the DHCP Server for the use of the wireless handsets and not assigned to any other device.

Programming Records

Use the WLAN Programming Records spreadsheet (a Microsoft Excel™ file) to record settings for each handset. The spreadsheet is located on the BCM documentation CD. Use the recorded settings when you configure the handsets. Refer to WLAN Handsets 2210/2211 configuration on page 55 for instructions on configuring the handsets.

WLAN IP Telephony Manager 2245 installation

This section explains how to install the WLAN IP Telephony Manager 2245.

For an overview of the WLAN IP Telephony Manager 2245, refer to "WLAN IP Telephony Manager 2245" on page 33.

For information on configuring the WLAN IP Telephony Manager 2245, refer to "WLAN IP Telephony Manager 2245 configuration" on page 45.

Tasks:
• Prepare to install the WLAN IP Telephony Manager 2245 ("Preparing to install the WLAN IP Telephony Manager 2245" on page 41)
• Mounting the WLAN IP Telephony Manager 2245 ("Mounting the WLAN IP Telephony Manager 2245" on page 42)
• Connect to the Local Area Network (LAN) ("Connecting to the LAN" on page 43)
• Connect the power ("Connecting the power" on page 43)
• Prepare to install the WLAN IP Telephony Manager 2245 ("Preparing to install the WLAN IP Telephony Manager 2245" on page 41)
• Mounting the WLAN IP Telephony Manager 2245 ("Mounting the WLAN IP Telephony Manager 2245" on page 42)
• Connect to the Local Area Network (LAN) ("Connecting to the LAN" on page 43)
• Connect the power ("Connecting the power" on page 43)

Preparing to install the WLAN IP Telephony Manager 2245

Required materials

Each WLAN IP Telephony Manager 2245 is shipped with one Class II AC adapter with 24 volt (V) DC, 1 amp (A) output.

The following equipment must be provided by the customer:

- Power outlet(s) – must accept the provided AC adapter.
- Choose one of the following:
  - — Plywood backboard space – the WLAN IP Telephony Manager 2245 is designed to be wall-mounted to ¾" plywood securely screwed to the wall.
  - — Optional WLAN IP Telephony Manager 2245 rack-mount kit (must be ordered separately), containing mounting plates and screws.

- Screws – used to mount the WLAN IP Telephony Manager 2245 to the wall. Four 3/4-inch #8 panhead wood screws (or similar devices) are required.
- CAT5 cable with an RJ-45 connector for the WLAN IP Telephony Manager 2245 – provides a connection to the Ethernet switch.
- DB-9 female null-modem cable – required for initial configuration of the WLAN IP Telephony Manager 2245.

Note: The WLAN IP Telephony Manager 2245 requires a maximum distance of 325 feet (100 meters) from the Ethernet switch.

Pre-installation checklist

Ensure that the following requirements have been met prior to installation:

- The location is adequate and power is available.
- Access Points (APs) are SVP-compatible and coverage is adequate.
- A dedicated line is available for remote modem access, if needed.
- The telephone system administrator is on-site to program the existing telephone system.

Mounting the WLAN IP Telephony Manager 2245

The WLAN IP Telephony Manager 2245 can be mounted either vertically or horizontally.

The rack-mount kit is designed for mounting the WLAN IP Telephony Manager 2245 in a standard 19-inch rack and contains the following equipment:

- Mounting plates – two for each WLAN IP Telephony Manager 2245 to be mounted.
- Screws – four rack-mount screws for each WLAN IP Telephony Manager 2245 to be mounted.

Wall-mounting the WLAN IP Telephony Manager 2245

1. Use a 1/8-inch drill bit to drill four pilot holes, on 1.84-inch by 12.1-inch centers (approximately equivalent to 1 13/16-inch by 12 1/8-inch).
2. Insert the 3/4-inch #8 screws in the pilot holes and tighten, leaving a 1/8-inch to 1/4-inch gap from the wall.
3. Slide the WLAN IP Telephony Manager 2245 over the screws until the WLAN IP Telephony Manager 2245 drops into place in the keyhole openings of the flange.
4. Tighten screws fully.

Rack-mounting the WLAN IP Telephony Manager 2245

1. Remove the corner screws from the WLAN IP Telephony Manager 2245.
2. Screw the U-shaped end (round screw holes) of the two mounting plates to the WLAN IP Telephony Manager 2245.
3. Screw the other end of the two mounting plates (oblong screw holes) to the rack.
4. Repeat steps 1-3 for each additional WLAN IP Telephony Manager 2245. The mounting plate is designed to provide the correct minimum spacing between units. When mounting multiple units, stack the units in the rack as closely as possible.

Connecting to the LAN

Use an RJ-45 cable to connect the **NETWORK** port on the WLAN IP Telephony Manager 2245 to the connecting port on the Ethernet switch.

Connecting the power

1. Connect the power plug from the AC adapter to the jack labeled **PWR** on the WLAN IP Telephony Manager 2245.

Warning: Use only the provided Class II AC adapter with output 24V DC, 1A.

2. Plug the AC adapter into a standard AC outlet (that is, one that is compliant with local power supply) to supply power to the WLAN IP Telephony Manager 2245.

   The system cycles through diagnostic testing and the LEDs blink for approximately one minute.

3. When the system is ready for use, verify the following:
   - The **ERROR** LED is off.
   - **Status 1** is blinking.

Removing a WLAN IP Telephony Manager 2245

1. Disconnect the power cables and LAN cables from the WLAN IP Telephony Manager 2245.
2. Remove the failed device from the wall or rack mount.

WLAN IP Telephony Manager 2245 configuration

This section explains how to configure the WLAN IP Telephony Manager 2245 (SVP II Server).

For an overview of the WLAN IP Telephony Manager 2245, refer to "WLAN IP Telephony Manager 2245" on page 33.

For information on installing the WLAN IP Telephony Manager 2245, refer to "WLAN IP Telephony Manager 2245 installation" on page 41.

Tasks:
• Connect to the WLAN IP Telephony Manager 2245 ("Connecting to the WLAN IP Telephony Manager 2245" on page 45)
• Configure the WLAN IP Telephony Manager 2245 ("Configuring the WLAN IP Telephony Manager 2245" on page 47)
• Change the password ("Changing the password" on page 52)
• Save the configuration ("Saving the configuration" on page 53)
• Check system status ("Checking the system status" on page 54)

Connecting to the WLAN IP Telephony Manager 2245

The initial connection to the WLAN IP Telephony Manager 2245 must be made through a serial connection to establish the IP address of the WLAN IP Telephony Manager 2245 and the maximum number of active calls per access point.

Further configuration and administration can be performed at a later time through a Telnet connection.

The Telnet method of connection is also used for routine maintenance of the WLAN IP Telephony Manager 2245.

Security Note: Nortel Networks recommends that you change the default password immediately for security reasons (see "Changing the password" on page 52).

Connecting through a serial port

1. Connect the WLAN IP Telephony Manager 2245 to the serial port of a terminal or PC using a DB-9 female, null-modem cable.
2. Run a terminal emulation program (such as HyperTerminal™), or use a VT-100 terminal with the following configuration:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Note: If using Windows 2000, Service Pack 2 must be installed to enable the use of HyperTerminal™.

3. Press **Enter** to display the login screen.
4. Enter the default login name (**admin)** and the default password (**admin)**.

   Programming note: The login name and password are case-sensitive.

   The **NetLink SVP-II System** menu appears. See NetLink SVP-II System menu on page 47.

Connecting through a Telnet session

1. Run a Telnet session to the IP address of the WLAN IP Telephony Manager 2245.
2. Enter the login name and the password.

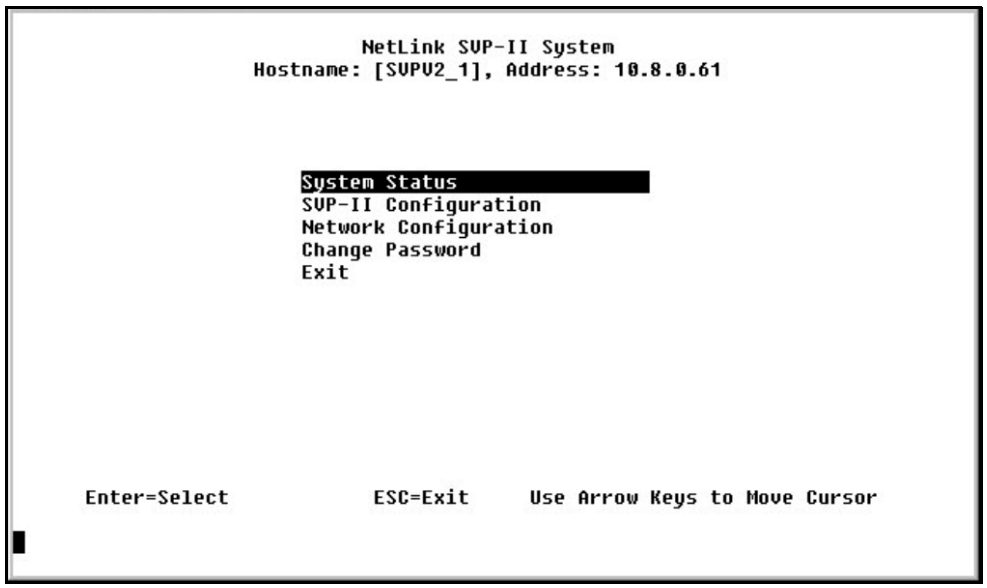
   Programming note: The login name and password are case-sensitive.

   The **NetLink SVP-II System** menu appears. See NetLink SVP-II System menu on page 47.

NetLink SVP-II System menu

The **NetLink SVP-II System** menu is shown in Figure 3.

Figure 3 NetLink SVP-II System menu



The **NetLink SVP-II System** menu contains the following options:

- System Status – view error messages, status of operation, and firmware code version.
- SVP-II Configuration – set the mode and reset the system.
- Network Configuration – set network configuration options including IP address and hostname.
- Change Password – change the password for the WLAN IP Telephony Manager 2245.

Configuring the WLAN IP Telephony Manager 2245

Configuration of the network must be done before the WLAN IP Telephony Manager 2245 can be configured. Therefore, the WLAN IP Telephony Manager 2245 is configured initially on the **Network Configuration** screen. This initial configuration must be performed through the serial port to configure the IP address and the maximum number of active calls per access point.

Tips: Nortel Networks recommends that you complete the initial network configuration through the serial connection.

The WLAN IP Telephony Manager 2245 is then configured on the **SVP-II Configuration** screen. The mode of the WLAN IP Telephony Manager 2245 is configured here. This screen is also used to lock the WLAN IP Telephony Manager 2245 for maintenance and reset the WLAN IP Telephony Manager 2245 after maintenance.

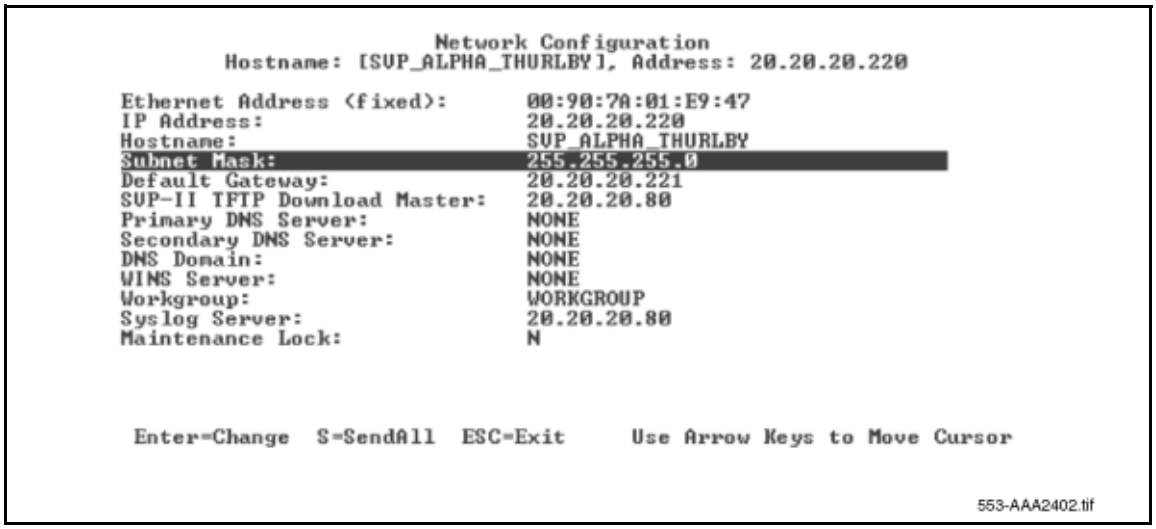
The WLAN IP Telephony Manager 2245 automatically locks for maintenance if the IP address is changed. When a Maintenance Lock occurs, the WLAN IP Telephony Manager 2245 must be reset upon exit. All active calls are terminated during a reset.

Configuring the network

1 Select **Network Configuration** from the **NetLink SVP-II System** menu.

The **Network Configuration** screen appears (see Figure 4).

Figure 4 Network Configuration screen



2 Configure the following fields with information provided by the network administrator:

- **IP Address** – enter the complete IP address for the WLAN IP Telephony Manager 2245, including digits and periods.

Note: If this WLAN IP Telephony Manager 2245 is the master, it must have a static IP address. Do not use DHCP to assign the IP address of the master WLAN IP Telephony Manager 2245. Slave WLAN IP Telephony Managers 2245, in a multiple WLAN IP Telephony Manager 2245 environment, can have their IP addresses assigned by DHCP.

- **Hostname** – optional field. Change the hostname of this WLAN IP Telephony Manager 2245, if desired. Hostname is for identification purposes only.

  Programming note: Spaces cannot be entered in this field.

- **Subnet mask** – the subnet mask of the subnet.
- **Default Gateway** – the default gateway for the subnet.

- **SVP-II TFTP Download Master** – the IP address of the TFTP Server where the firmware update files are saved. Enter one of the following:
  - **NONE** – disables this function
  - **TFTP server IP address** – IP address of the TFTP Server that transfers firmware updates to the WLAN IP Telephony Manager 2245.
- **Primary DNS Server, Secondary DNS Server, DNS Domain** – used to configure DNSs. Obtain the settings from the network administrator.

  Optionally, enter **DHCP**. This enables the DHCP client in the WLAN IP Telephony Manager 2245 to attempt to automatically obtain a valid IP address from the DHCP Server. The DHCP setting is only valid when the IP address is obtained from DHCP.
- **WINS Server** – the IP address of the Windows Name Services (WINS) Server. Obtain the settings from the network administrator.

  Optionally, enter **DHCP**. This enables the DHCP client in the WLAN IP Telephony Manager 2245 to attempt to automatically obtain a valid IP address from the DHCP Server. The DHCP setting is only valid when the IP address is obtained from DHCP.

  When WINS is configured, the WLAN IP Telephony Manager 2245 can translate hostnames to IP addresses. This means that using Telnet, the WLAN IP Telephony Manager 2245 can be accessed using its hostname rather than its IP address.
- **Syslog Server** – the IP address of the server where the system logs are written for the WLAN IP Telephony Manager 2245. If a Syslog Server is configured, a message is sent to the Syslog Server when an alarm is generated. Enter one of the following:
  - **NONE** – disables this function
  - IP address of the Syslog Server
- **Maintenance Lock** – indicates if the WLAN IP Telephony Manager 2245 is in Maintenance Lock mode.
- **SendAll** – in a system with multiple WLAN IP Telephony Managers 2245, the SendAll option is provided to speed configuration and ensure identical settings. The S=SendAll option enables configuration parameters of the selected field to be sent to every WLAN IP Telephony Manager 2245 on the LAN. SendAll can only be used after the IP address is configured on each WLAN IP Telephony Manager 2245 using a serial connection. If identical configuration parameters are to be used for all WLAN IP Telephony Managers 2245, configure only the IP address and custom hostname (if desired) on each WLAN IP Telephony Manager 2245 using the initial serial connection. Then connect through the LAN to this WLAN IP Telephony Manager 2245 and use SendAll to transmit identical configuration options of each field to all WLAN IP Telephony Managers 2245

Note: If SendAll is used on the system, all passwords must be identical. Do not change the password at the initial configuration if the SendAll option will be used. Use the default password and change it globally, if desired, after a LAN connection is established for all WLAN IP Telephony Managers 2245. If you want independent administration of each WLAN IP Telephony Manager 2245, the passwords can be set during initial configuration.

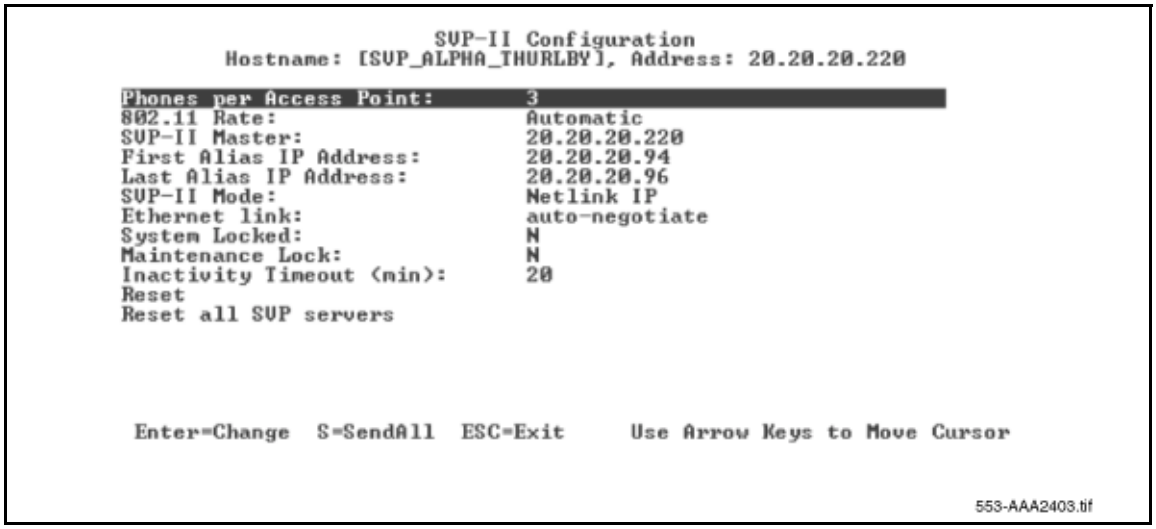
3 Reset the WLAN IP Telephony Manager 2245 in order to save the configuration parameters. Follow the steps in "Saving the configuration" on page 53 to save the configuration.

Configuring the SVP-II

1 Select **SVP-II Configuration** from the **NetLink SVP-II System** menu to configure additional options for WLAN IP Telephony Manager 2245.

The **SVP-II Configuration** screen appears (see Figure 5).

Figure 5 SVP-II Configuration screen



2 Configure the following fields with information provided by the network administrator:

- **Phones per Access Point** – enter the number of simultaneous calls supported for the type of AP. AP specifications are described in Appendix A: Compatible Access Points on page 77.
- **802.11 Rate** – select **Automatic** to allow the wireless handset to determine its rate (up to 11Mbit/s). Select **1MB/2MB** to limit the transmission rate between the wireless handsets and APs.
- **SVP-II Master** – the IP address of the master of the WLAN IP Telephony Manager 2245 group must be identified. Select one of the following identification options:
  - — Enter the IP address of the master of the WLAN IP Telephony Managers 2245 in each WLAN IP Telephony Manager 2245 group. Include the periods used in the IP address.
  - — Enter **DHCP**. Ensure that the IP address of the master WLAN IP Telephony Manager 2245 has been configured in the DHCP Server and configure the other WLAN IP Telephony Managers 2245 to obtain the information from the DHCP Server.
  - — Enter **DNS**. Ensure that the IP address of the master WLAN IP Telephony Manager 2245 has been configured in the DNS Server and configure the other WLAN IP Telephony Managers 2245 to retrieve this information from the DNS Server.

- **First Alias IP Address/Last Alias IP Address** – enter the range of IP addresses that this WLAN IP Telephony Manager 2245 can use when acting as a proxy for the wireless handsets.

  Programming note: All alias addresses must be on the same subnet as the WLAN IP Telephony Manager 2245. The IP addresses cannot be duplicated on other subnets or WLAN IP Telephony Managers 2245. There is no limit to the number of IP addresses that can be assigned, but the capacity of each WLAN IP Telephony Manager 2245 is 500 wireless handsets.

- **SVP-II Mode** – select NetLink IP.
- **Ethernet link** – select **auto-negotiate** unless there is a need to specify the link speed.
- **System Locked** – use this option to take the system down for maintenance. The default is **N** (No). Select **Y** (Yes) to prevent any new calls from starting. Enter **N** to restore normal operation.
- **Maintenance Lock** – the system automatically sets this option to **Y** after certain maintenance activities that require reset, such as changing the IP address. Maintenance Lock prevents any new calls from starting. The administrator cannot change this option; it is automatically set by the system. Reset the system at exit to clear Maintenance Lock.
- **Reset** – if this option is selected, a prompt appears to reset the WLAN IP Telephony Manager 2245 when exiting the SVP-II Configuration screen.
- **Reset all SVP servers** – if this option is selected, all WLAN IP Telephony Managers 2245 on the subnet are reset.

3 Reset the WLAN IP Telephony Manager 2245 in order to save the configuration parameters. Follow the steps in "Saving the configuration" on page 53 to save the configuration.

Note: Resetting the WLAN IP Telephony Manager 2245 terminates any calls in progress.

Nortel Networks recommends making configuration changes (can involve locking the system) and resetting the WLAN IP Telephony Manager 2245 during off-hours.

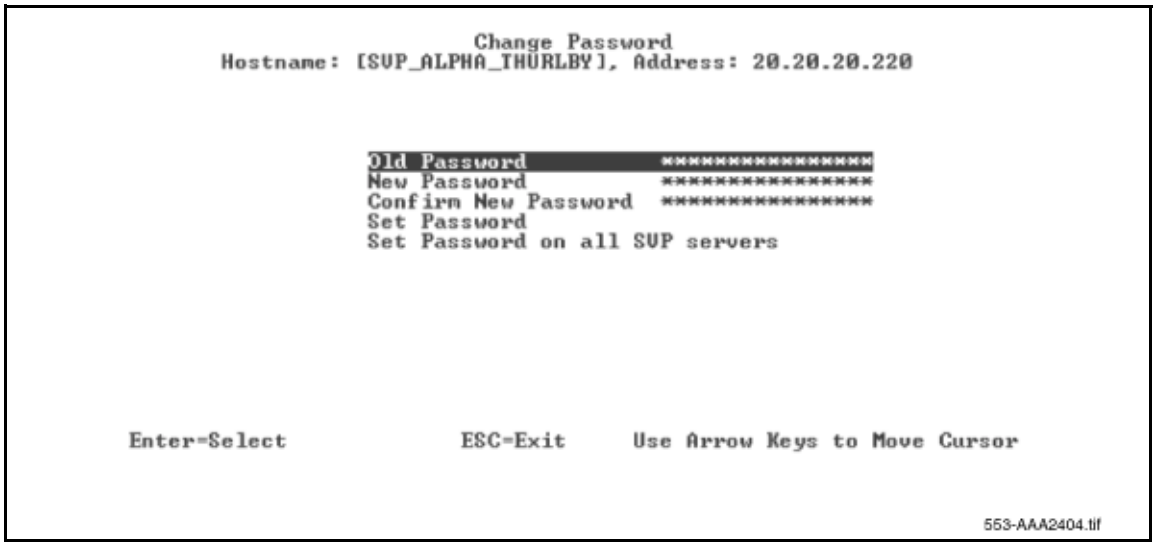
Note: Nortel Networks recommends setting the Keep DN Alive feature, as well as call forward, during the lock-down and reset periods.

Changing the password

1 Select **Change Password** from the **NetLink SVP-II System** menu.

The **Change Password** screen appears. See Figure 6.

Figure 6 Change Password screen



2 Enter the old password.

3 Enter the new password.

The password parameters are as follows:

- must be more than four characters in length
- first character must be a letter
- other characters can be letters or numbers
- dashes, spaces, and punctuation marks are not allowed (alphanumeric only)

4 Confirm the new password.

5 Select **Set Password** and press **Enter**. Alternatively, press the **S** key on the keyboard.

6 Reset the WLAN IP Telephony Manager 2245 in order to save the configuration parameters. Follow the steps in "Saving the configuration" on page 53 to save the configuration.

Tips: Record the password and keep it in a safe place. If the password is forgotten, contact Nortel Networks for assistance.

Saving the configuration

Once any change is made to the configuration of the WLAN IP Telephony Manager 2245, the system must be re-booted/reset for the change to take effect. You can make all configuration changes necessary on the **Network Configuration**, **SVP-II Configuration**, and **Change Password** screens, and then reset the system to save changes.

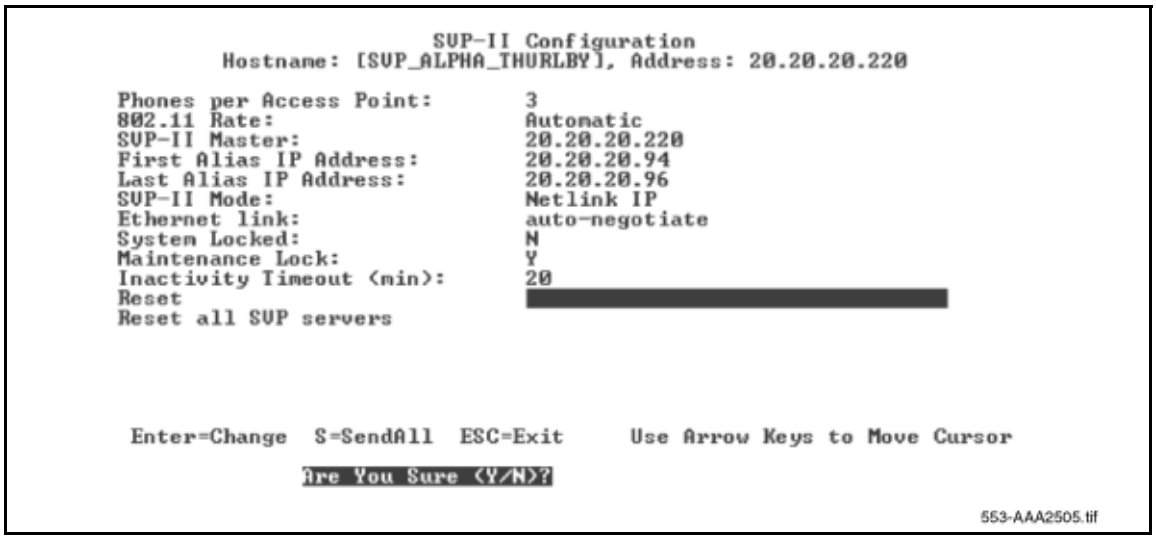
Reset the system in one of two ways:

- Reset the system from the SVP-II Configuration screen:

  a Select **Reset** from the **SVP-II Configuration** menu.

  A prompt appears asking if the configuration is to be saved (**Are you sure <Y/N>?**).

Figure 7 SVP-Configuration screen with reset prompt



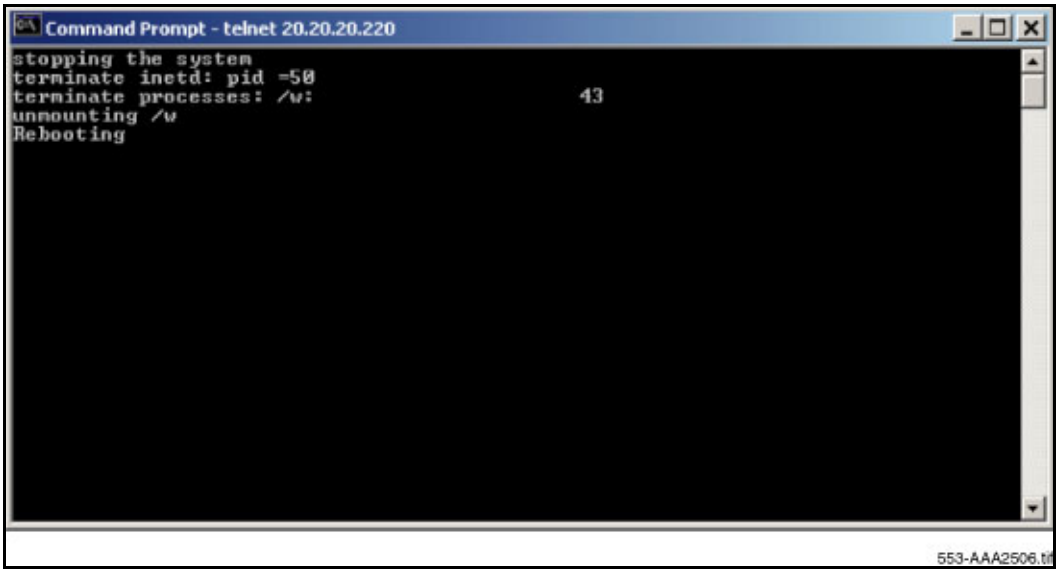
  b Enter **Y** to save changes, or **N** to disregard changes.

- Power off the WLAN IP Telephony Manager 2245, then power it on again.

Note: If Maintenance Lock is on, you can exit from the configuration screens and from Telnet with no warning that you must reset the system. However, if a user tries to make a call from one of the IP Handsets 2210/2211, he or she will see “SYSTEM LOCKED” on the LCD of the handset. Users cannot make calls until the WLAN IP Telephony Manager 2245 is reset.

Once the reset is complete, you will see the screen shown in Figure 8 on page 54 (Telnet connection). During reset, the WLAN Handsets 2210/2211 display shows “SVP has no response”, then “No Net”. The handsets beep when the WLAN IP Telephony Manager has re-booted.

Figure 8 Telnet screen after reset



Checking the system status

Information about system alarms and network status is obtained through the **System Status** menu screen. For information on the **System Status** menu screen, refer to "Troubleshooting" on page 71.

WLAN Handsets 2210/2211 configuration

This section describes the WLAN Handsets 2210/2211 and explains how to configure them.

For an overview of the WLAN handsets, refer to "WLAN Handsets 2210/2211" on page 55.

Tasks:
• Configure WLAN Handset 2210 and WLAN Handset 2211 ("Configuring the WLAN Handsets 2210/2211" on page 60)
• Program the features on the WLAN handsets ("Programming the WLAN Handsets 2210/2211" on page 70)
• Test the WLAN handsets ("Appendix C: Testing the WLAN Handsets 2210/2211" on page 109)

Note: The WLAN Handsets 2210/2211 require special configuration to enable them to communicate with the optional WLAN Application Gateway 2246. Ensure that these settings are correct. Refer to Opening and using the Admin Menu on page 61.

WLAN Handsets 2210/2211

The WLAN Handsets 2210/2211 use VoIP technology on IEEE 802.11-compliant WLANs. APs use radio frequencies to transmit signals to and from the WLAN handsets.

Employees carry WLAN handsets to make and receive calls as they move throughout the building. The WLAN handsets are used only on the premises; they are not cellular phones. Just like wired telephones, the WLAN handsets receive calls directly, receive transferred calls, transfer calls to other extensions, and make outside and long-distance calls (subject to corporate restrictions).

The radio frequencies use Spread Spectrum radio technology, which comes in two variations:

- Direct Sequence (DS)
- Frequency Hopping (FH)

The WLAN Handsets 2210/2211 use Direct Sequence Spread Spectrum (DSSS) radio technology to optimize bandwidth and minimize jitter on the WLAN IP Telephony network. The WLAN handsets are not compatible with FH.

The WLAN Handsets 2210/2211 on an 802.11b network operate at a transmission rate of up to 11 Mbit/s in a DSSS system.

WLAN Handsets 2210/2211 functions

Table 3 describes the handset functions available during different states.

Table 3 Handset functions available in idle and offhook states

Idle state	Offhook state
FCN key: • Mute • Hold • Goodbye • Directory • Inbox • Outbox • Quit • Copy	The functions available are the same as those on the IP Phone 2004, with the exception of handsfree.
LINE key: • Intercom • Intercom • 3, 4, 5, and 6 are system-programmed features	

Language

The menus and screens of the WLAN Handsets 2210/2211 display in English only. International characters are supported for BCM prompts, depending on the market profile. BCM-based prompts display in English, French, and Spanish.

Wired Equivalent Privacy

The WLAN Handsets 2210/2211 support Wired Equivalent Privacy (WEP) as defined by the 802.11b specification. WEP increases the security of the wireless LAN to a level similar to a wired Ethernet LAN. WEP is turned on and off using the APs.

Loss of signal

If a wireless handset is out of range of all APs, it waits 20 seconds for a signal to return. If a signal is not re-acquired within 20 seconds, the wireless handset loses connection to the BCM and any calls are dropped. When the wireless handset comes back into range of an AP, it re-establishes a connection to the BCM and goes through the system registration process.

Note: If a wireless handset is out of contact with the system for four seconds during the UNIStim messaging process (worst case scenario), then a UNIStim failure could result. This can cause the wireless handset to lose the UNIStim association with the BCM.

Codecs

The WLAN Handsets 2210/2211 are compatible with the G.711 and G.729a/ab codecs. No configuration is required on the wireless handsets.

If the WLAN Handsets 2210/2211 are registered to the same BCM as IP Phone 200x sets, then the system administrator must configure only the subset of codecs that is supported by both the WLAN Handsets 2210/2211 and the IP Phone 200x sets.

If it is necessary for the IP Phone 200x to use a codec that is not supported on the WLAN Handsets 2210/2211 (for example, G.723.1), the wireless handsets must be configured on their own separate node.

Jitter buffer

The WLAN Handsets 2210/2211 do not support a configurable jitter buffer. If they receive the `Jitter Buffer Configuration` UNIStim message, the command is ignored. Any adjustment to the jitter buffer setting has no effect on the handsets.

RTP and RTCP

The WLAN Handsets 2210/2211 do not support RTCP. If RTCP packets are sent to the phone (these are actually sent to the WLAN IP Telephony Manager 2245), they are discarded. When the handsets are queried for their RTCP statistics, the handsets respond with 0 for jitter, 0 for latency and 0 for packet loss.

IP Phone 2004 mapping

The WLAN Handsets 2210/2211 emulate the IP Phone 2004. All IP Phone 2004 functions and messaging features are supported, where possible. The speakerphone function and functions that require use of the volume keys are not supported. See Feature limitations on page 75 for more information on the limitations of the WLAN Handsets 2210/2211.

The large screen area of the IP Phone 2004 and its numerous keys are mapped onto the smaller screen and fewer buttons of the wireless handsets. The button mapping from the IP Phone 2004 to the WLAN Handsets 2210/2211 is designed to preserve nearly all of the functionality of the IP Phone 2004 within a small, mobile device.

Feature and key assignment

The line keys of the IP Phone 2004 are numbered 1, 2, 3, 4, 5, and 6, and are situated to the left and right of the display screen (see Figure 9 on page 58). These IP Phone 2004 line keys are mapped to the **LINE** button on the WLAN Handsets 2210/2211 (see Figure 10 on page 59).

Figure 9 IP Phone 2004

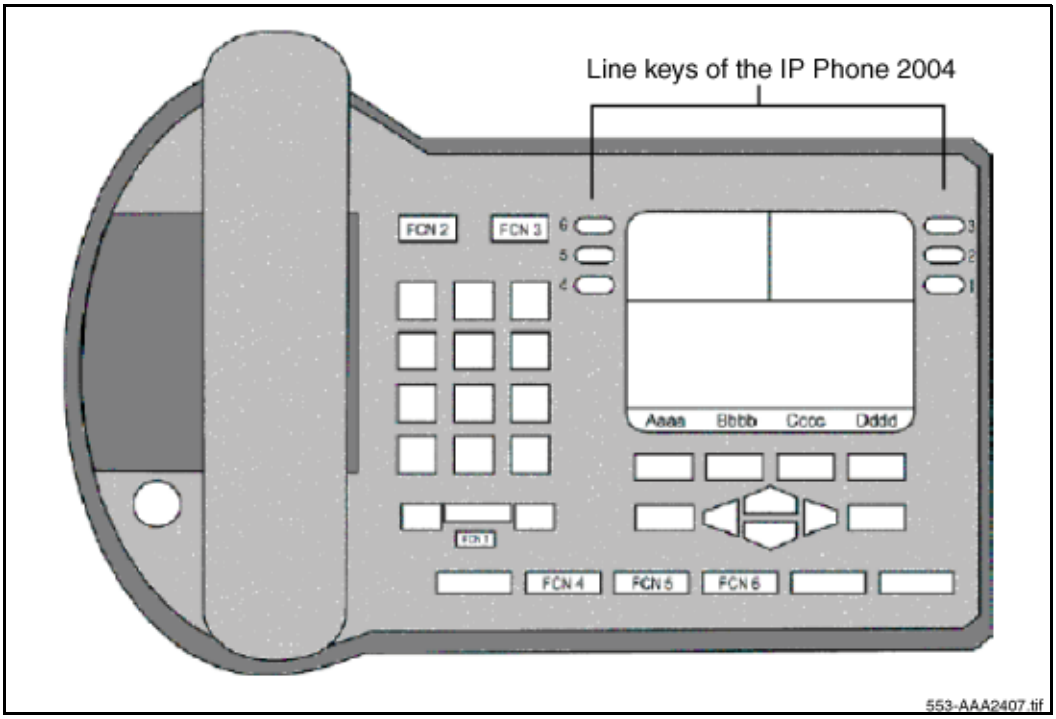
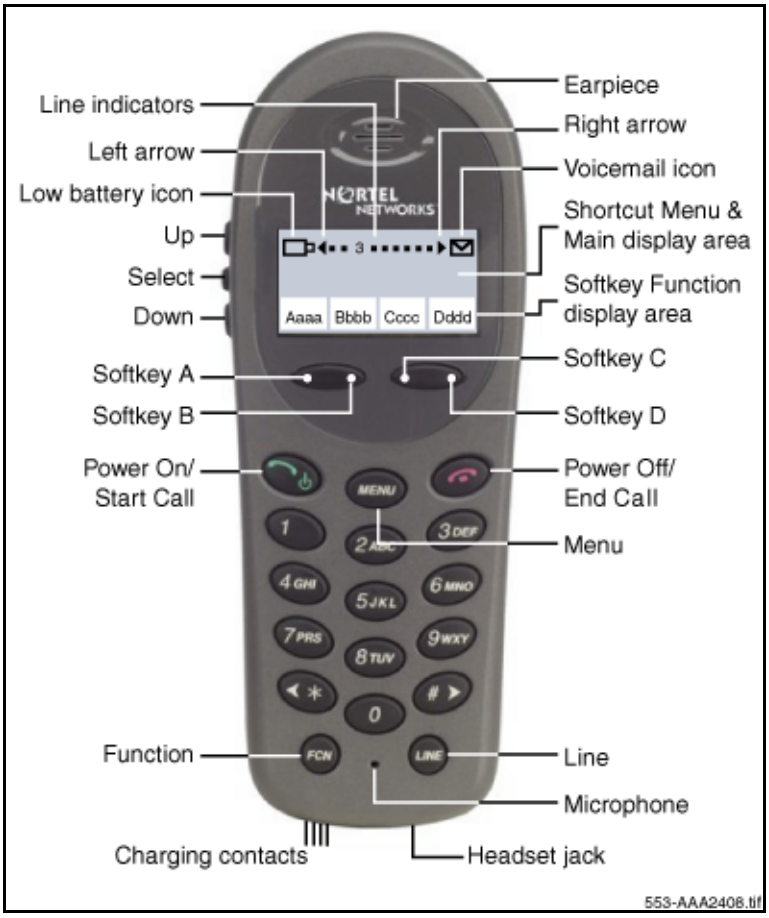


Figure 10 WLAN Handset 2210



The IP Phone 2004 has several fixed feature keys. The WLAN Handsets 2210/2211 support the eight features that are suitable to a mobile user through the Function (**FCN**) key on the wireless handset. When **FCN** is pressed, a screen that lists the features and the assigned keys appears. Press **FCN** again to display a second screen that lists more features and their assigned keys. Refer to the *Nortel Networks WLAN Handset 2210/2211 User Guide* for the list of features/functions available using the FCN key.

If a third-party application has been assigned to a key, that information appears on the feature list. The Line keys on the WLAN Handsets 2210/2211 correspond to the six buttons on the IP Phone 2004. Refer to the *Nortel Networks WLAN Handset 2210/2211 User Guide* for details.

Table 4 lists the keys of the IP Phone 2004 (default settings) and the corresponding key sequences on the wireless handsets.

Table 4 IP Phone 2004 mapping to the wireless handsets

IP Phone 2004 key	Feature	Wireless handset key sequence
1	Call forward	Line + 6
2	Conference	Line + 5
3	Last number redial	Line + 4
4	Page - General	Line + 3
5	Intercom	Line + 2
6	Intercom	Line + 1
Mute	Mute	Fcn + 1
Hold	Hold	Fcn + 2
Goodbye	Goodbye	Fcn + 3
Directory	Directory	Fcn + 4
Inbox	Inbox	Fcn + 5
Outbox	Outbox	Fcn + 6
Quit	Quit	Fcn + 7
Copy	Copy	Fcn + 8
Softkey	Context-specific	Softkey A
Softkey	Context-specific	Softkey B
Softkey	Context-specific	Softkey C
Softkey	Context-specific	Softkey D

Configuring the WLAN Handsets 2210/2211

WLAN handset configuration is performed after the WLAN IP Telephony Manager 2245 has been installed and configured. The steps to configure a WLAN handset must be performed for each wireless handset.

Provision the WLAN Handsets 2210/2211 on the BCM system in the same manner as an IP Phone 2004. Ensure you have the BCM firmware download completed before configuring the handsets. For detailed information, refer to *IP Line: Description, Installation and Operation* (553-3001-365).

Note: The WLAN Handset 2210/2211 is identified as an IP Phone 2004 in the IP Terminal List when the set is offline.

The Admin Menu contains configuration options that are stored locally on each wireless handset. Every wireless handset is independent. If the default settings are not appropriate, the Admin options must be configured in each handset that requires different settings.

Opening and using the Admin Menu

1. With the wireless handset powered OFF, simultaneously press and hold the **Power On/Start Call** and **Power Off/End Call** keys.
2. Release the **Power On/Start Call** key, then release the **Power Off/End Call** key. The first option on the Admin Menu appears.

Note: If an Admin Password has been configured, the display requires its entry before opening the Admin Menu. If no password is configured, the display proceeds directly into the Admin Menu.

3. Press the **Up** and **Down** keys on the left side of the set to scroll through the menu options.
4. Press the **OK** softkey to change the selected option.
5. Press the **Up** softkey to return to the previous menu level.
6. Press the **Exit** softkey to exit the menus.

Tip: An asterisk (*) next to an option indicates that it is selected.

Making an alphanumeric string entry

1. On the keypad, press the **OK** button to change the entry.
2. Press the number key of the desired letter.

   The number appears.
3. Press the number key again to display the first letter associated with that key.
4. Press the key again to scroll through the letters associated with that key.

   Example: if **2** is pressed repeatedly, 2, A, B, C, a, b, and c are displayed.

Table 5 shows the keys to use to enter non-numeric characters or other characters not represented on the keypad.:

Table 5 Keys to enter non-numeric characters (Sheet 1 of 2)

To enter...	Press
. - _! # $ % & ‘ ( ) , : ; / \ = @ ~	1
Space	0

Table 5 Keys to enter non-numeric characters (Sheet 2 of 2)

To enter...	Press
Q q	7
Z z	9

When the correct entry appears, press the right arrow to move to the next character. Repeat for each digit/letter of the entry.

Press the **Save** softkey to save the entry and return to the menu. Press the **Cncl** key to abort and return to the menu without saving any changes.

Admin Menu options

Table 6 lists the Admin Menu options. Detailed descriptions of each option follow the table.

Note: The IP Handsets 2210/2211 configuration menu can differ from the items listed in Table 6 if the firmware has not been updated. Refer to the guide that accompanies the handset for configuration settings until the firmware is updated.

The default settings are indicated with an asterisk (*).

Table 6 Admin Menu options (Sheet 1 of 2)

Admin menu option	2nd level	3rd level	4th Level
IP Address	* Use DHCP		
	Static IP	Phone IP TFTP Server IP OAI Server IP Default Gateway Subnet Mask SVP Server IP Server 1 IP Server 1 Port Server 2 IP Server 2 Port	
ESS ID	Static Entry		
	* Learn Once		
	Learn Always		
License Management	Set Current		

Table 6 Admin Menu options (Sheet 2 of 2)

Admin menu option	2nd level	3rd level	4th Level
Restore Defaults			
Site Survey Mode			
Regulatory Domain			
Security	* None		
	WEP	Authentication	Open System Shared Key
		WEP On/Off	
		Key Information	Default Key Key Length Key 1 – 4
		Rotation Secret	
	Cisco FSR	Username Password#	
Terminal type	i2004 3rd party		
OAI on/off	Enable OAI Disable OAI		
Admin PW			

IP Address menu

There are two modes in which the wireless handset can operate: DHCP-enabled or Static IP. Select the mode for operation from the IP Address menu:

- *** Use DHCP –** use DHCP to assign an IP address each time the wireless handset is turned on. If DHCP is enabled, the wireless handset also receives all other IP address configurations from DHCP.
- **Static IP –** allows a fixed IP address to be manually configured. If this option is selected, the wireless handset prompts for the IP addresses of each configurable network component. When entering IP addresses, enter the digits only, including leading zeroes. No periods are required.

Regardless of the mode in which the wireless handset is operating, the following components must be configured:

- **Phone IP –** the IP address of the wireless handset. This is automatically assigned if DHCP is used. If using Static IP configuration, obtain a unique IP address for each wireless handset from the network administrator.
- **SVP Server IP** – the IP address of the master of the WLAN IP Telephony Manager 2245 group. If using Static IP configuration, this is simply the IP address of the WLAN IP Telephony Manager 2245. The WLAN IP Telephony Manager 2245 must be statically configured to have a permanent IP address. If DHCP is being used, the wireless handset will try the following, in order:

— DHCP option 151

— DNS lookup of “SLNKSVP2” if the DHCP options 6 (DNS Server) and 15 (Domain Name) are configured.

- **Server 1 IP –** the published IP address of the BCM. If the wireless handset is using static IP address configuration, enter the published IP address of the BCM. If the WLAN handset is using DHCP, the DHCP Server must be configured to provide the published IP address (and UDP port number) of the BCM using one of the following DHCP options: 46, 128, 144, 157, 191, and 251.
- **Server 1 Port** – the UDP port number used by the wireless handset to contact the LTPS Node Connect Service to request registration with the BCM. If the wireless handset is using static IP address configuration, enter port number **4100**. If the WLAN handset is using DHCP, the DHCP Server must be configured to provide the published IP address and UDP port number of the BCM using one of the following DHCP options: 46, 128, 144, 157, 191, and 251.

The following components can be configured optionally:

- **TFTP Server IP** – the IP address of the TFTP Server on the network that holds firmware images for updating the wireless handsets. If this feature is configured (not set to 0.0.0.0 or 255.255.255.255), either through Static IP configuration, through using DHCP option 66 (TFTP Server), or the Boot server/next server (siaddr) field, the wireless handset checks for different firmware each time it is powered on or comes back into range of the network. This check takes only a short time and ensures that all wireless handsets in the network are kept up-to-date with the same version of firmware.

Note: It does not matter if the firmware version on the TFTP Server is newer or older. If the versions are different, the wireless handsets download the firmware from the TFTP Server.

- **OAI Server IP** – the IP address of the WLAN Application Gateway 2246 (if using). If using Static IP configuration, this is simply the IP address of the WLAN Application Gateway 2246. If DHCP is being used, the wireless handset tries DHCP option 152.
- **Default Gateway and Subnet Mask** – used to identify subnets, when using a complex network which includes routers. Both of these fields must be configured (not set to 0.0.0.0 or 255.255.255.255) to enable the wireless handset to contact any network components on a different subnet. They can be configured using Static IP configuration or through DHCP options 3 (Default Gateway) and 1 (Subnet Mask) respectively. Contact the network administrator for the proper settings for the network.

Note: The wireless handsets cannot roam across subnets, since the wireless handsets cannot change their IP address while operational. Ensure that all the APs are attached to the same subnet for proper operation. The wireless handset can change subnets if DHCP is enabled, and the wireless handset is powered off, then back on, when within range of APs on a new subnet.

- **Server 2 IP** – the IP address of the secondary Nortel Networks device. Currently, the wireless handset does not make use of this information. If using Static IP configuration, this is simply the IP address of the device. If DHCP is being used, the wireless handset tries to obtain the device's IP address and port information using the following DHCP options: 46, 128, 144, 157, 191, and 251.
- **Server 2 Port** – the port number used by the secondary Nortel Networks device to communicate with IP phones. Currently, the wireless handset does not make use of this information. If using Static IP configuration, consult the device's documentation for port numbers. If DHCP is being used, the wireless handset tries to obtain the device's IP address and port information using the following DHCP options: 43, 128, 144, 157, 191, and 251.

ESSID

Select the option that enables the wireless handset to acquire APs with the correct ESSID each time it is turned on.

With regard to Automatic Learn options, Broadcast ESSID must be enabled in the APs for ESSID learning to function (or contact the AP vendor for specifics). Overlapping wireless systems complicate the use of ESSID learning, as the wireless handset in an overlapping area could receive conflicting signals. If this is the situation at the site, use Static Entry or Learn Once in an area without overlapping ESSIDs.

- **Learn Once** – allows the wireless handset to scan all ESSIDs for a DHCP Server or TFTP Server, or both. Once either is found, the wireless handset retains the ESSID from the AP with which it associates at that point. When overlapping wireless systems exist, the Learn Once feature allows the wireless handset to use only the ESSID established the first time at all subsequent power-ons. This ESSID is retained by the wireless handset until the ESSID option is reselected.
- **Learn Always** – allows the wireless handset to automatically learn the ESSID at each power-on or loss of contact with the wireless LAN (out of range). This may be useful if the wireless handset will be used at more than one site.
- **Static Entry** – if the APs do not accept Broadcast ESSID, or if there are overlapping wireless systems in use at the site, enter the correct ESSID manually.

License Management

License Management enables selection of the VoIP protocol that the site is licensed to download and run. The UNIStim Protocol to use for the WLAN Handsets 2210/2211 is **010**. Any other protocol causes the wireless handset to malfunction.

After selecting the correct protocol for the site, Nortel Networks recommends upgrading the firmware for the wireless handsets. See WLAN Handset 2210/2211 firmware upgrade on page 31.

Restore Defaults

The Restore Defaults option resets all user and administrative parameters to their factory defaults. During configuration, press the right arrow to skip this mode.

Site Survey mode

Site Survey Mode is used to check the signal strength from APs. Site Survey Mode must be set to **10** to make a connection. When Site Survey Mode is selected, the wireless handset remains in this mode until it is powered off. During configuration, press the right arrow to skip this mode. See "Site survey" on page 113 for more information on using this mode.

Regulatory Domain

The Regulatory Domain defaults to North America on the wireless handset display. FCC requirements dictate that the menu for changing the domain be available by password, which in this case is the **LINE** button. To change the domain, press **LINE** and then enter the digits that represent the domain of the site. Both digits must be entered.

The following are domain digits:

- **01** – North America
- **02** – Europe (except Spain and France) and Japan
- **04** – Spain
- **05** – France

Note: As of this writing, Spain and France are adopting the general European Regulatory rules. Check with the wireless LAN administrator or supplier for the correct domain to enter in these countries.

Security

The following are the security options:

- **None** – disables any 802.11 encryption or security authentication mechanisms.
- **WEP** – a wireless encryption protocol that encrypts data frames on the wireless medium, providing greater security in the wireless network. If WEP Encryption is required at this site, each wireless handset must be configured to correspond with the encryption protocol set up in the APs. Select the entries from the following options to enable the wireless handset to acquire the system.

Note: By default, WEP options are off. If WEP is desired, options must be set in the wireless handset that match those set in the APs.

Security Note: Encryption codes display as they are entered. For security reasons, codes do not display when a user returns to the Admin Menu Encryption options.

Security Note: WEP can be set to "optional" at the AP if there are wireless devices in use that do not have WEP capability. All wireless devices must be upgraded to WEP capability for a fully-secured WEP environment.

Set each of the following options to match exactly the settings in the APs:

- **Authentication –** select either **Open System** or **Shared** Key.
- **WEP –** select either **WEP Off** or **WEP On**.
- **Key Information –** scroll through the options.
  - **Default Key** – enter the key number specified for use by the wireless handsets. This will be **1** through **4**.
  - **Key Length** – select either **40-bit** or **128-bit** depending on the key length specified for use at this site.
  - **Key 1- 4** – scroll to the key option that corresponds to the **Default Key** that was entered above. Press **Select** and enter the encryption key as a sequence of hexadecimal characters. Use the **2** and **3** keys to access hexadecimal digits **A-F**. Use softkeys to advance to the next digit and backspace. For 40-bit keys, enter 10 digits; for 128-bit keys, enter 26 digits. The display scrolls as needed.

- **Rotation Secret** – used for proprietary WEP key rotation if this feature is supported in the system.
- **Cisco FSR** – to provide the highest level of security without compromising voice quality on Cisco Aironet WLAN APs, the Fast Secure Roaming (FSR) mechanism has been implemented. FSR is designed to minimize call interruptions for wireless handset users as they roam throughout a facility. Existing Aironet 350, 1100, and 1200 APs may require a firmware upgrade to support FSR. Cisco FSR requires advanced configuration of the Cisco APs in the site. See the Cisco representative for detailed documentation on configuring the APs and other required security services on the wired network. To configure Cisco FSR in the wireless handset, enter a Radius Server username and password into each wireless handset.
  - **Username** – enter a username that matches an entry on the Radius Server. Usernames are alphanumeric strings, and can be entered using the alphanumeric string entry technique. See Making an alphanumeric string entry on page 61.
  - **Password –** enter the password that corresponds to this Username.

Terminal type

The Terminal type configures the wireless handset for the type of PBX in use. The BCM requires the **i2004** setting.

OAI on/off

Nortel Networks Open Application Interface (OAI) enables the wireless handset to connect with the optional WLAN Application Gateway 2246. This device allows third-party computer applications to display alphanumeric messages on the wireless handset display and take input from the wireless handset keypad.

If a WLAN Application Gateway 2246 is installed in the system, OAI may be optionally enabled in each wireless handset. Select whether the wireless handset should attempt to connect to the WLAN Application Gateway 2246 by choosing either the **Enable** or **Disable** options in this menu. By default, OAI is disabled.

If OAI is enabled, and a WLAN Application Gateway 2246 IP address is available to the wireless handset (either through DHCP or Static IP configuration), then the wireless handset communicates with the WLAN Application Gateway 2246 at power-on, and then periodically during the time the wireless handset is powered on.

If a WLAN Application Gateway 2246 is not installed at the site, leave the OAI feature disabled to preserve network bandwidth and battery life.

Admin PW

The optional Admin Password (PW) controls access to the administration functions in the Admin Menu of the wireless handset. Configure the password in each wireless handset for which controlled access is desired. Wireless handsets are shipped without an Admin password.

Note: If this option is selected on a wireless handset that already has a configured password, and the **Exit** softkey is pressed with no entry, the password is erased. This means that the wireless handset will not require an Admin Password to access the Admin Menu.

Tip: Record the wireless handset Admin password and store it in a safe place. If the password is lost or forgotten, contact Nortel Networks Technical Support.

Downloading the WLAN handset firmware

All WLAN Handsets 2210/2211 are shipped with a generic firmware load that allows them to associate to a WLAN and download their functional firmware from a TFTP Server. The wireless handsets do not function properly without downloading their appropriate firmware.

Note: It is the customer’s responsibility to download the firmware upgrades from the Nortel Networks web site to the TFTP Server.

Pre-download checklist

The following requirements must be met to download firmware by over-the-air file transfer:

- A wireless LAN must be properly configured and operational through the use of 802.11b SVP-compliant wireless APs.
- The Nortel Networks WLAN IP Telephony Manager 2245 must be connected to the network and completely operational.
- A TFTP Server must be available on the network to load the appropriate firmware into the wireless handsets.
- The ESSID (you can get this from the AP installer).
- The IP addresses of the WLAN IP Telephony Manager 2245 and TFTP server to configure the handsets.
- The battery pack on the wireless handsets must be fully charged.

Downloading the firmware

1. Download the latest WLAN Handsets 2210/2211 firmware (.zip file) from the Nortel Networks web site.
2. Extract the three firmware files from the .zip file and place them on the TFTP Server. Ensure the TFTP Server is on before completing the following steps.
3. If statically assigning IP addresses, ensure that the wireless handset IP address, TFTP Server IP address, Subnet Mask, and Default Gateway information are accurate in the Admin Menu of the wireless handset. If using a DHCP Server, ensure that the DHCP options are configured.
4. Ensure the wireless handset has properly configured ESSID and Reg Domain Information within the Admin Menu. If broadcast ESSIDs are accepted at the APs, the handset automatically learns the ESSID information when powering on.
5. Using the Admin Menu on the wireless handset, ensure the License Management menu option is set to **010**. This ensures the handset will check for the proper UNIStim firmware files each time it powers on.
6. Power on the wireless handset.

   The firmware now downloads to the wireless handset. The status bar increments fully across the wireless handset display for each function that is being performed in the download process.

   Upon completion of the update process, the wireless handset re-boots with the new firmware.
7. Register the wireless handset with the BCM as if it were an IP Phone 2004.
8. Properly label the wireless handset with the appropriate extension number.

For future firmware upgrades, simply update the firmware files that are stored on the TFTP Server. Each time the wireless handset is powered on, it checks with the TFTP Server to ensure it has the proper firmware version. It downloads the new firmware, when found.

Programming the WLAN Handsets 2210/2211

The Line keys 1-6 on the WLAN Handsets 2210/2211 are programmable by the end user. These Line keys can be programmed in the wireless handset in the same manner they are programmed on the IP Phone 2004.

Follow the steps in "Programming the Line keys" to program keys on the wireless handset.

Programming the Line keys

There are three menus available for the Line keys. The menu available is dependent on the state of the WLAN Handset 2210/2211. Two menus are programmed using the BCM and one is user-defined. The IP features list is programmed using the BCM and is available to all handsets.

For information on user-defined programming of the Line keys and using the WLAN handset features, refer to the *Nortel Networks WLAN Handset 2210/2211 User Guide*.

Configuring the idle state display

When the set is in the idle state, it displays "Ext.----". Nortel Networks recommends that you configure this display to show the Directory Number (DN) of the handset. To configure this display, place the set in the idle state:

1. Press the **FCN** key.
2. Select **Extension** from the menu using the up and down arrow buttons on the left of the set.
3. Press **OK**.
   A screen appears.
4. Enter your the DN under **New Ext:** on this screen.

Troubleshooting

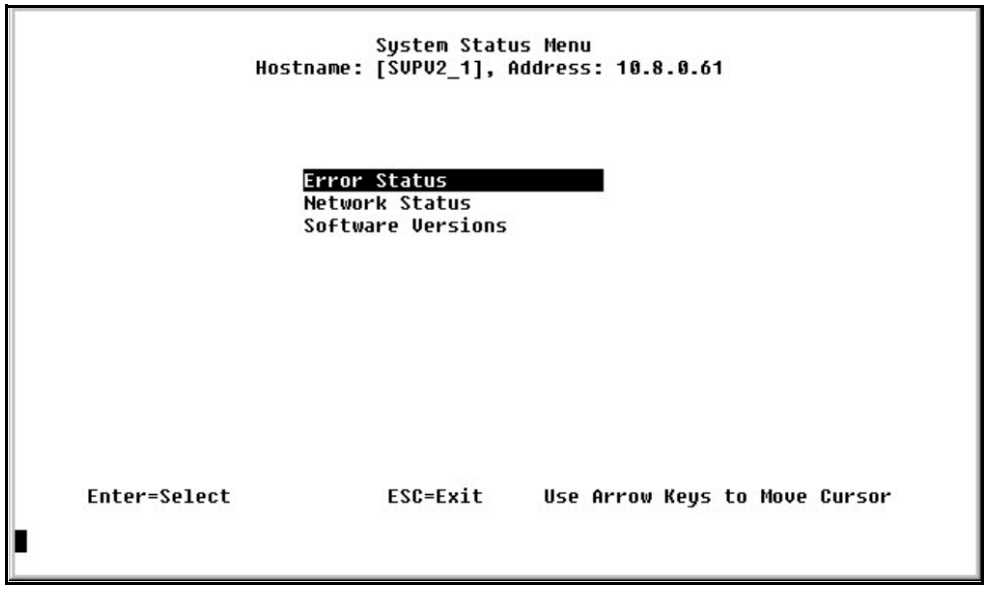
This section describes options for troubleshooting your WLAN system and its devices. For site and deployment information, refer to "Appendix D: Provisioning" on page 113.

Troubleshooting the WLAN IP Telephony Manager 2245

Options on the **System Status Menu** screen provide a window into the real-time operation of the components of the system. Use this data to evaluate system function and to troubleshoot areas that may be experiencing problems.

The **System Status Menu** screen is shown in Figure 11.

Figure 11 System Status Menu screen



The following options can be selected:

- **Error Status** – displays alarm and error message information.
- **Network Status** – displays information about the Ethernet network to which the WLAN IP Telephony Manager 2245 is connected.
- **Software Versions** – lists the software versions for the WLAN IP Telephony Manager 2245.

Error Status screen

The **Error Status** screen displays any alarms that indicate a system malfunction. Some of these alarms are easily remedied. Others require a call to Nortel Networks Technical Support.

From the **System Status Menu** screen, select **Error Status**. The **Error Status** screen displays active alarms on the WLAN IP Telephony Manager 2245. Table 7 lists the alarms and the actions required to eliminate the alarm.

Table 7 WLAN IP Telephony Manager 2245 active alarms and actions

Alarm text	Action
Maximum payload usage reached	Reduce usage, clear alarm
Maximum telephone usage reached	Reduce usage, clear alarm
Maximum Access Point usage reached	Reduce usage, clear alarm
Maximum call usage reached	Reduce usage, clear alarm
SRP audio delayed	Reduce usage, clear alarm
SRP audio lost	Reduce usage, clear alarm
No IP address	Configure an IP address

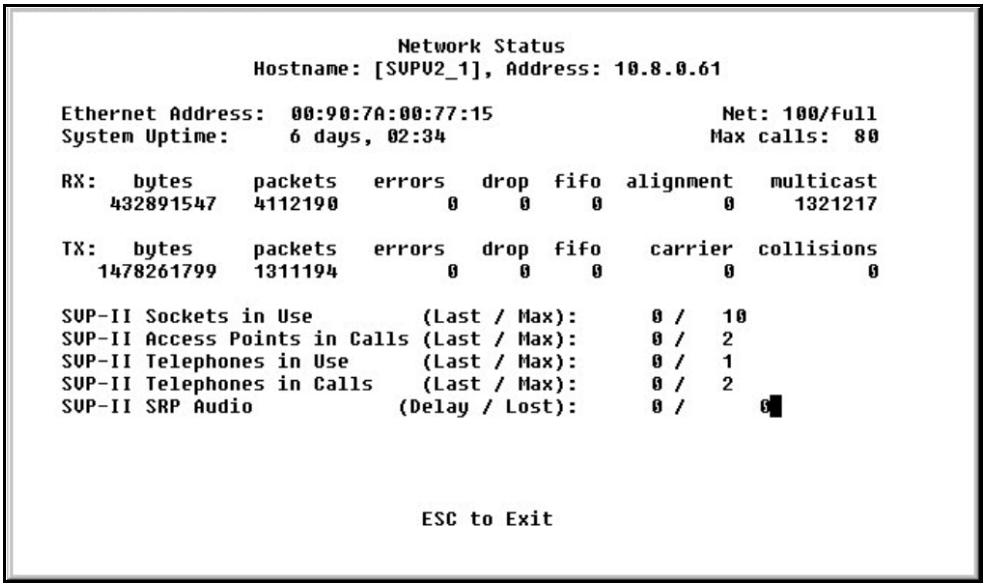
Press **C** to clear all alarms that can be cleared.

Network Status screen

The WLAN IP Telephony Manager 2245 is connected to the Ethernet network (LAN). The information about that connection is provided on the **Network Status** screen. The screen displays information about the Ethernet network. This information can help troubleshoot network problems.

To access the **Network Status** screen, select **Network Status** from the **System Status Menu** screen. The **Network Status** screen is shown in Figure 12 on page 73.

Figure 12 Network Status screen



The following information can be viewed:

- **Ethernet Address** – MAC address of the WLAN IP Telephony Manager 2245 (hexadecimal).
- **System Uptime** – the number of days, hours, and minutes since the WLAN IP Telephony Manager 2245 was last reset.
- **Net** – the type of connection to the Ethernet switch currently utilized.
  Displayed as 10 (10BaseT) or 100 (100BaseT)/half-duplex, full-duplex, or auto-negotiate.
- **maximum calls** – number of calls that can be supported by the WLAN IP Telephony Manager 2245 (depends on network speed).
- **RX** – Ethernet statistics about the received signal during System Uptime.
  - **bytes** – bytes received
  - **packets** – packets received
  - **errors** – sum of all receive errors (long packet, short packet, CRC, overrun, alignment)
  - **drop** – packets dropped due to insufficient memory
  - **fifo** – overrun occurred during reception
  - **alignment** – non-octet-aligned packets (number of bits not divisible by 8)
  - **multicast** – packets received with a broadcast or multicast destination address
- **TX** – Ethernet statistics about the transmitted signal during System Uptime.
  - **bytes** – bytes transmitted
  - **packets** – packets transmitted
  - **errors** – sum of all transmit errors (heartbeat, late collision, repeated collision, underrun, carrier)
  - **drop** – packets dropped due to insufficient memory
  - **fifo** – underrun occurred during transmission

  - **carrier** – carrier lost during transmission
  - **collisions** – packets deferred (delayed) due to collision
- **SVP-II Access Points in Use** – number of APs used by WLAN handsets, either in standby or in a call. '**Last**' is current, '**Max**' is the maximum number in use at one time.
- **SVP-II Access Points in Calls** – number of APs with WLAN handsets in a call.
- **SVP-II Telephones in Use** – number of WLAN handsets in standby or in a call.
- **SVP-II Telephones in Calls** – number of WLAN handsets in a call.
- **SVP-II SRP Audio**:
  - **Delay** – SRP audio packets whose transmission was momentarily delayed.
  - **Lost** – SRP audio packets dropped due to insufficient memory resources.

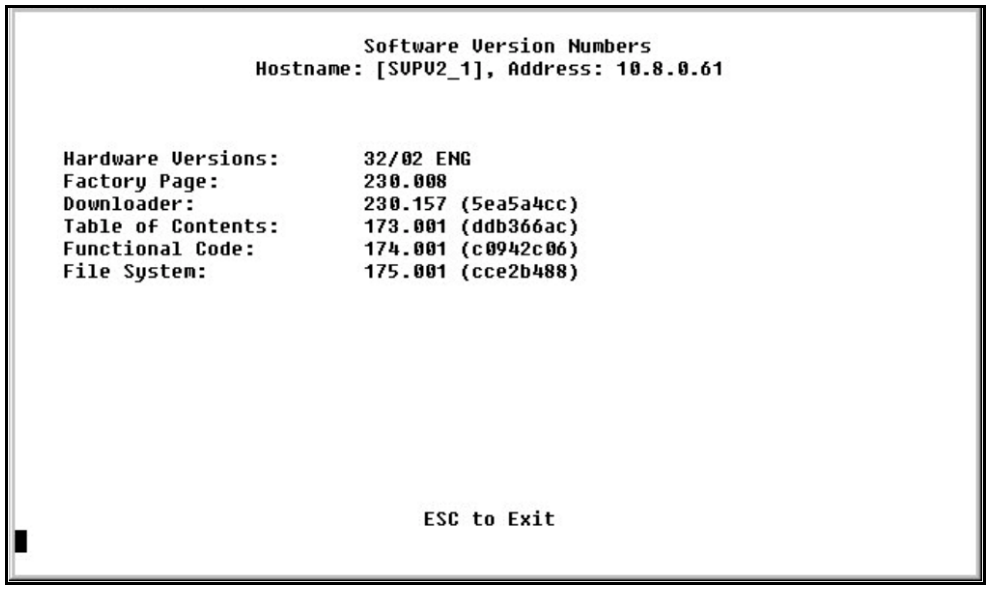
Software Version Numbers screen

The **Software Version Numbers** screen provides information about the firmware version currently running on the WLAN IP Telephony Manager 2245.

This information helps to determine if the most recent firmware version is running. This information assists Nortel Networks Technical Support in troubleshooting firmware problems.

To access the **Software Version Numbers** screen, select **Software Version** from the **System Status Menu**. The **Software Version Numbers** screen is shown in Figure 13.

Figure 13 Software Version Numbers screen



The Table of Contents firmware will always be 173.xxx, where xxx is the release number. Similarly the Functional Code will always be 174.xxx and the File System will always be 175.xxx.

Duplex mismatch

A duplex mismatch anywhere on the WLAN can cause the WLAN IP Telephony Manager 2245 to operate improperly. Double-check WLAN connections and interfaces to ensure that they are all configured as full-duplex.

Feature limitations

The following limitations exist for the WLAN Handsets 2210/2211:

- The WLAN Handsets 2210/2211 do not have handsfree capability. Therefore, any feature which requires handsfree is not supported or only partially supported. For example, when there is an incoming call to an IP Phone 2004 set that is idle, but offhook, the set buzzes the handsfree speaker. This feature is not supported on WLAN Handsets 2210/2211.
- The WLAN Handsets 2210/2211 do not support all of the buttons present on an IP Phone 2004. The following keys are not available:
  - Expand to PC key
  - Navigation (Left, Right, Up, Down) Keys
  - Headset Key
  - Handsfree Key
  - Services

  Any operation that requires those keys is not supported.
- Any feature that requires scroll buttons is not supported. For example, Feature * 900 is not supported on the WLAN Handsets 2210/2211. The use of Call Logs and set-based administration is also limited due to the lack of up and down scroll buttons (for example, you cannot erase old logs from the Call Log).
- The WLAN handsets do not have a signal strength indicator.
- The WLAN handsets do not support the Net6 feature.
- Feature F*6 affects the display, but does not change the ring tone.
- Feature F*7 does not affect the LCD display.
- The WLAN handsets can access SBA, but they cannot navigate the menus.
- The set display is 4 lines by 19 characters. Therefore, some lines may be truncated or compressed by a special compression mechanism. Also, the softkey labels are four characters wide instead of seven characters as on an IP Phone 2004.
- The WLAN IP Telephony Manager 2245 can block calls due to bandwidth constraints on an AP without notifying the BCM. The caller hears ringback, and the call-forward-no answer treatment will be applied (for example, go to voicemail).
- If the call originates from a wireless handset that is on a bandwidth-restricted AP, the caller hears a warning tone (three “chirps”) and the call is disconnected.

- If a set is mobile and moves into an AP that is already at capacity, the handset remains associated with an AP that has sufficient bandwidth. This could result in degraded signal and voice quality and, ultimately, a call could be dropped.

Tip: Nortel Networks recommends that you always press the **End** key after a call is completed — even if the party on the other end terminates the call. If the party on the other end terminates the call and you do not press **End**, the WLAN Handset 2210/2211 continues to exchange messages with the WLAN IP Telephony Manager 2245. This consumes RF bandwidth and reduces battery life.

- End to end QoS (that is, DiffServ) is not supported. Layer 2 QoS (that is, 802.1 p/q) is not supported. Any UNIStim commands that attempt to manipulate Layer 2 or Layer 3 QoS parameters are ignored.
- Only G.711 and G.729 A/B codecs are supported.
- Any UNIStim messages that configure the jitter buffer are ignored.
- RTCP is not supported. Incoming RTCP packets are discarded.
- WLAN Handsets 2210/2211 do not appear in UM DN Registration > IP Wireless DN's reg'd.

Syslog Server

The WLAN IP Telephony Manager 2245 and other network devices, such as APs and handsets, can log all error messages to a standard Syslog Server. See “Configuring the network” on page 48 for configuring the WLAN IP Telephony Manager 2245 to send error logs to the Syslog Server.

A Syslog Server listens for incoming syslog messages on UDP port 514 and then processes the messages according to local administrative procedures. Usually the syslog messages are logged for subsequent review by the system operator.

The Syslog Server can be any RFC 3164-compliant log server. The WLAN IP Telephony Manager 2245, WSS 2250/2270, WLAN Application Gateway 2246, WLAN APs 2220/2221, and WLAN Access Ports 2230/2231 can be configured to generate syslog messages. For information about configuring these devices, refer to the manufacturer’s documentation. The following websites also contain information and documentation:

- WLAN Handsets 2210/2211 – NortelNetworks.com
- WSS 2250/2270 – NortelNetworks.com
- WLAN Access Ports 2230/2231 – NortelNetworks.com
- WLAN IP Telephony Manager 2245 – SpectraLink.com
- Other APs – refer to the specific manufacturer’s website

Appendix A: Compatible Access Points

Introduction

Table 8 lists APs that are compatible with WLAN Handsets 2210/2211 operating on the WLAN IP Telephony Manager 2245. 802.11b APs generally support up to 12 simultaneous calls per AP. However, calls per AP can vary by AP manufacturer and can depend on the codec used by the host handset. WEP encryption has been tested and is compatible with all APs listed.

Note 1: Lab Tested indicates that the AP software has been fully tested and approved.

Note 2: Field Verified indicates that the AP software has been verified in field installations.

Table 8 SVP-compliant APs (Sheet 1 of 2)

Manufacturer	Make/Model	Radio Technology	Software Version	Lab Tested	Field Verified
Airespace	Wireless Enterprise Platform	802.11b	1.2.59	√	√
Alvarion	BreezeNET Pro. 11 Series [1]	802.11-FH	4.4.2 or 5.0.103	√	
Avaya	Wireless Access Point AP-1, AP-2	802.11b	3.83 or later		√
Avaya	Wireless Access Point AP-3	802.11b	2.2.4 or later		√
Avaya	Wireless Access Point AP-4, AP-6	802.11b	2.2.4 or later		√
Cisco	Aironet 3500	802.11-FH	8.12 or later	√	√
Cisco	Aironet 4500	802.11b	8.12 or later	√	√
Cisco	Aironet 4800	802.11b	8.24 or later	√	√
Cisco	Aironet 340	802.11b	11.10T, 12.01T1 or later	√	√
Cisco	Aironet 350 [2]	802.11b	VxWorks: 11.10T, 12.01T1 or later IOS: 12.2.13-JA1	√	√
Cisco	Aironet 1100	802.11b	12.2.13-JA1	√	√
Cisco	Aironet 1200	802.11b	VxWorks: 12.01T1 or later IOS: 12.2.13-JA1	√	√
Enterasys	RoamAbout Access Point 2000	802.11b	V6.02		√
Enterasys	RoamAbout R2	802.11b	V4.01.09 or later		√
HP	ProCurve Wireless Access Point 520wl [3]	802.11b	2.3.1 or later		√
Intermec	MobileLAN access 2100, 2101, 2102	802.11b	1.91 or later		√
Intermec	MobileLAN access WA21, WA22	802.11b	1.91 or later		√
LXE	6520 Access Point	802.11b	3.83 or later		√

Table 8 SVP-compliant APs (Sheet 2 of 2)

Manufacturer	Make/Model	Radio Technology	Software Version	Lab Tested	Field Verified
Proxim	Orinoco AP-500, AP-1000	802.11b	3.83 or later	√	√
Proxim	Orinoco AP 600b	802.11b	2.3.1 or later		√
Proxim	Orinoco AP-2000	802.11b	2.3.1 or later		√
Symbol	Spectrum 24 FH	802.11-FH	4.02-12	√	√
Symbol	Spectrum 24 DS (4131)	802.11b	3.50-18		√
Symbol	Wireless Switch System (WS5000 & AP100)	802.11b	1.1.4.30SP1		√
Teklogix	9150 Wireless Gateway	802.11b	K112p or later		√
Telxon	Air-I/O 802FH UAP	802.11-FH	8.24	√	√
Telxon	Air-I/O 802DS UAP, Air-I/O 802DS 11 UAP	802.11b	8.12 or 8.24	√	√

[1] Alvarion BreezeNET Pro.11 Series software version 4.4.5 is not compatible with the WLAN IP Handsets 2210/2211.

[2] Cisco Aironet 350 software version 11.21 is not compatible with the WLAN IP Handsets 2210/2211.

[3] For detailed setup instructions for the HP Procurve Wireless Access Point 520wl, use the Proxim AP 2000 Configuration Note.

Appendix B: WLAN Application Gateway 2246

WLAN Application Gateway 2246

The WLAN Application Gateway 2246 is an optional device that enables third-party applications to communicate directly with up to 10 000 WLAN handsets. The WLAN Application Gateway 2246 is connected to the LAN Ethernet switch through an RJ-45/CAT5 cable.

The Application Server is connected through the RS-232 port or through the Ethernet connection. The client's system can include a LAN and its Application Server with a TAP connection to a communications device such as a paging controller.

A WLAN Application Gateway 2246 supports 64 to 10 000 wireless handsets, depending on the model of Gateway, as listed in Table 9.

Table 9 Model numbers with maximum number of users

Model number	Maximum number of users
MOG600	64
MOG710	128
MOG720	256
MOG730	512
MOG740	1024
MOG750	10000

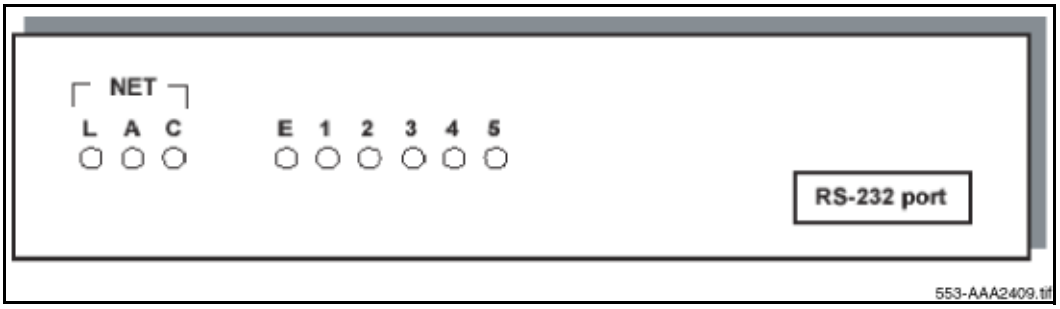
The optional WLAN Application Gateway 2246 requires a 10 Mbit/s half-duplex switched Ethernet connection.

Physical description

There are two different WLAN Application Gateway 2246 models with similar front panel indicators. Refer to Figure 14 on page 80 and Figure 15 on page 80.

The MOG6xx model supports up to 64 users.

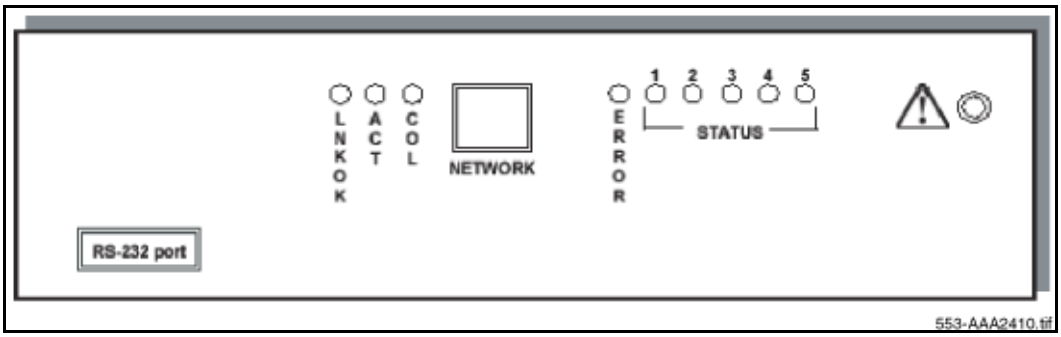
Figure 14 Model MOG6xx



The power jack and network port are located on the back of the Model MOG6xx.

The MOG7xx model is available in scaled increments to support up to 10 000 users.

Figure 15 MOG7xx



The two types of LEDs on the front panels of both the MOG6xx model and the MOG7xx model are the following:

- Network Link LEDs
  - **(L)NKOK**: lit when there is a network connection (for example, LINK OK)
  - **(A)CT**: lit if there is system activity
  - **(C)OL**: lit if there are network collisions
  - **(E)RROR**: lit when the system has detected an error
- Status LEDs that indicate system messages and status.
  - **1**: heartbeat, indicates the WLAN Application Gateway 2246 is running
  - **2, 3, and 4**: currently unused
  - **5**: System master

Installation

This section explains how to install the WLAN Application Gateway 2246.

For an overview of the WLAN Application Gateway 2246, refer to "WLAN Application Gateway 2246" on page 79.

For information on configuring the WLAN Application Gateway 2246, refer to "Configuration" on page 86.

Tasks:
• Prepare to install the WLAN Application Gateway 2246 ("Preparing to install the WLAN Application Gateway 2246" on page 81)
• Mounting the WLAN Application Gateway 2246 ("Mounting the WLAN Application Gateway 2246" on page 82)
• Connect to the Local Area Network (LAN) ("Connecting to the LAN" on page 82)
• Connect the power ("Connecting the power" on page 83)
• Connect to the Application Server ("Connecting to the Application Server" on page 83)

If the WLAN Application Gateway 2246 is being added to an existing system, the entire system must be reset before the WLAN Application Gateway 2246 can be used.

Preparing to install the WLAN Application Gateway 2246

Required Materials

Each WLAN Application Gateway 2246 is shipped with one Class II AC adapter with 24V DC, 1A output.

The following equipment must be provided by the customer:

- 10BaseT CAT5 cable with an RJ-45 connector for the optional WLAN Application Gateway 2246 – provides a connection to the Ethernet switch.
- DB-9 female null-modem cable – required for initial configuration of the WLAN IP Telephony Manager 2245 and WLAN Application Gateway 2246.

Pre-installation checklist

Locate the WLAN Application Gateway 2246 in a space with:

- sufficient backboard mounting space and proximity to the LAN access device (switched Ethernet switch), Call Server, and power source
- rack-mount unit (if using)
- easy access to the front panel, which is used for cabling

- for the WLAN Application Gateway 2246, a maximum distance of 325 feet (100 meters) from the Ethernet switch

Mounting the WLAN Application Gateway 2246

The WLAN Application Gateway 2246 is physically connected to the Ethernet switch and can be placed in any convenient location within 325 feet (100 m) of the switch.

The WLAN Application Gateway 2246 can be mounted either vertically or horizontally.

The rack-mount kit is designed for mounting the WLAN Application Gateway 2246 in a standard 19-inch rack and contains the following equipment:

- Mounting plates – two for each WLAN Application Gateway 2246 to be mounted.
- Screws – four rack-mount screws for each WLAN Application Gateway 2246 to be mounted.

Wall-mounting the WLAN Application Gateway 2246

1. Use a 1/8-inch drill bit to drill four pilot holes, on 1.84-by-12.1 inch centers (approximately equivalent to 1-13/16 inch by 12-1/8 inch).
2. Insert the #8 x 3/4-inch screws in the pilot holes and tighten, leaving a 1/8 to 1/4-inch gap from the wall.
3. Slide the WLAN Application Gateway 2246 over the screws until it drops into place in the keyhole openings of the flange.
4. Tighten screws fully.

Rack-mounting the WLAN Application Gateway 2246

1. Remove the corner screws from the WLAN Application Gateway 2246.
2. Screw the U-shaped end (round screw holes) of the two mounting plates to the WLAN Application Gateway 2246.
3. Screw the other end of the two mounting plates (oblong screw holes) to the rack.
4. Repeat steps 1-3 for each additional WLAN Application Gateway 2246. The mounting plate is designed to provide the correct minimum spacing between units. When mounting multiple units, stack the units in the rack as closely as possible.

Connecting to the LAN

Use an RJ-45 cable to connect the **NETWORK** port on the WLAN Application Gateway 2246 to the connecting port on the Ethernet switch.

Connecting the power

1 Connect the power plug from the AC adapter to the power jack on the front (or rear) of the WLAN Application Gateway 2246.

Warning: Use only the provided Class II AC adapter with output 24V DC, 1A.

2 Plug the AC adapter into a 110V AC outlet to supply power to the WLAN Application Gateway 2246.

The system cycles through diagnostic testing and the LEDs blink for approximately one minute.

3 Apply power to the WLAN Application Gateway 2246. When the system is ready for use, verify the following:

- The **ERROR** LED is off.
- **LED 1** is blinking.

Connecting to the Application Server

The WLAN Application Gateway 2246 is connected to the site's LAN through an Ethernet switch. The connection to the Application Server can be accomplished by a direct connection (RS-232) or through the Ethernet connection. Only one of these connections can be used at one time.

The IP address of the WLAN Application Gateway 2246 must be set during configuration. Once the IP address is established, the WLAN Application Gateway 2246 can be accessed by the Application Server through the RS-232 port or the through the LAN using Telnet.

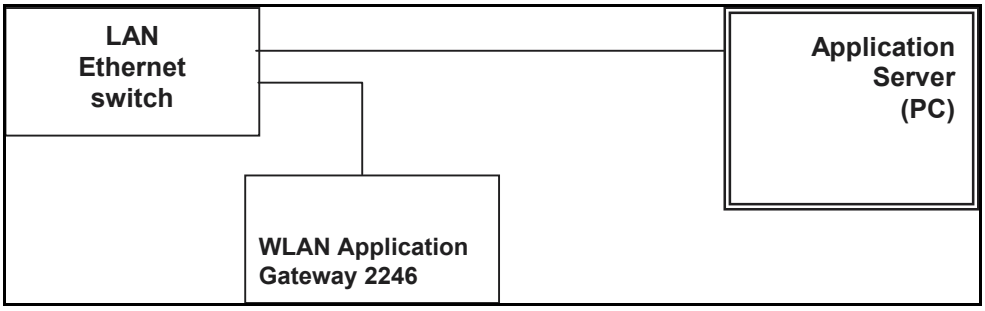
Some applications require a LAN connection between the Application Server and the WLAN Application Gateway 2246. There are three methods to achieve this connection:

- Connecting through the LAN – If the applications have the ability to communicate messages over TCP/IP, and do not require a serial connection.
- Connecting through an RS-232 port – if a LAN connection is not required or not possible. Some applications or systems may require an RS-232 connection between the Application Server and the WLAN Application Gateway 2246.
- Connecting through a modem – In some situations, a modem is used for remote administration.

Connecting through the LAN

The IP address must be configured for the WLAN Application Gateway 2246 to function on the LAN. Follow the application's instructions to identify the WLAN Application Gateway 2246 to the application. See Figure 16 on page 84.

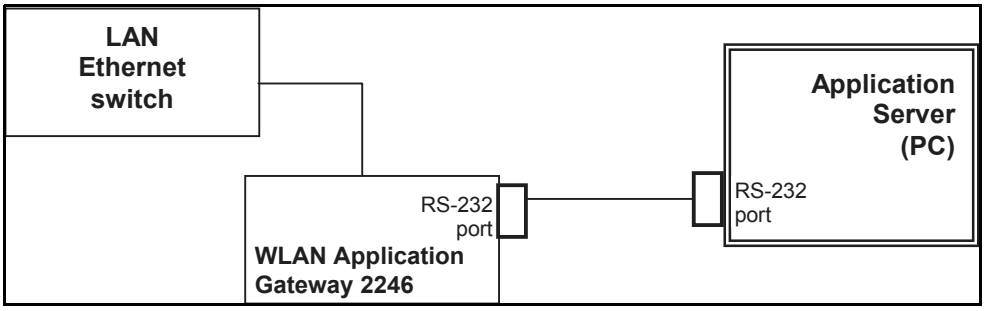
Figure 16 WLAN Application Gateway 2246 connection through the LAN



Connecting through an RS-232 port

Connect the Application Server to the WLAN Application Gateway 2246 serial port by using a cable that conforms to RS-232 standards for DTE-to-DTE connections (null modem cable). See Figure 17.

Figure 17 RS-232 cable connection



The WLAN Application Gateway 2246 uses the pins listed in Table 10 on the connector.

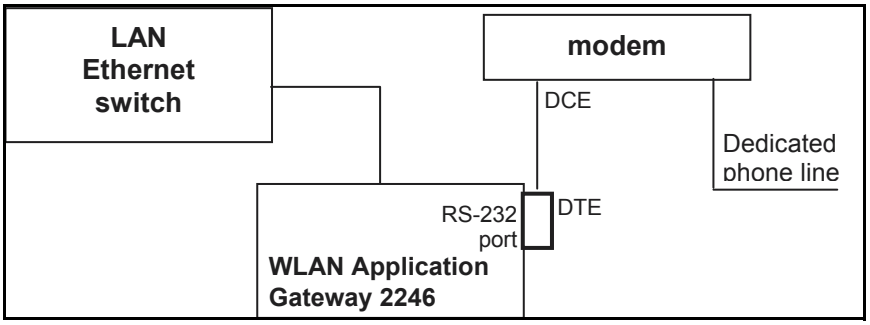
Table 10 Pins on the connector

Pin	Function
1	Carrier Detect
2	Data OAI Receives
3	Data OAI Transmits
5	Ground
7	Ready to Send
8	Clear to Send

Connect through a modem

Connect the modem to the WLAN Application Gateway serial port using a cable that conforms to RS-232 standards for DTE-to-DCE connections. See Figure 18.

Figure 18 WLAN Application Gateway 2246 connection through a modem



Configuration

This section explains how to configure the WLAN Application Gateway 2246.

For an overview of the WLAN Application Gateway 2246, refer to "WLAN Application Gateway 2246" on page 79.

For information on installing the WLAN IP Telephony Manager 2245, refer to "Installation" on page 80.

Tasks:
• Connect to the WLAN IP Telephony Manager 2245 ("Connecting to the WLAN Application Gateway 2246" on page 86)
• Configure the WLAN IP Telephony Manager 2245 ("Configuring the WLAN Application Gateway 2246" on page 88)
• Change the password ("Connecting to the WLAN Application Gateway 2246" on page 86)
• Save the configuration ("Connecting to the WLAN Application Gateway 2246" on page 86)
• Check system status ("Connecting to the WLAN Application Gateway 2246" on page 86)

Connecting to the WLAN Application Gateway 2246

The initial connection to the WLAN Application Gateway 2246 must be made through a serial connection to establish the IP address of the WLAN Application Gateway 2246 and the network parameters.

Further configuration and administration can be performed at a later time through a Telnet connection.

The Telnet method of connection is also used for routine maintenance of the WLAN Application Gateway 2246.

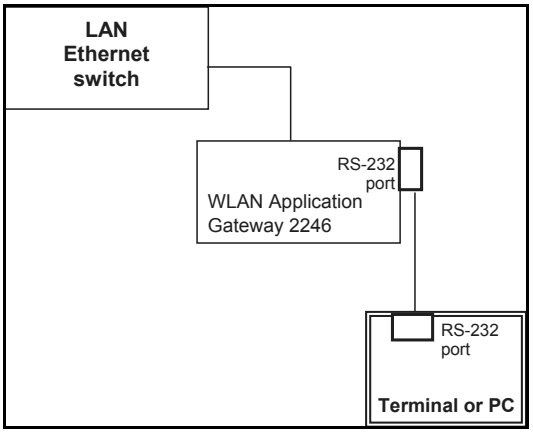
Tips: Nortel Networks recommends that you complete the initial network configuration through the serial connection.

You should also change the default password immediately for security reasons (see "Connecting to the WLAN Application Gateway 2246" on page 86).

Connecting through a serial port

1 Connect the WLAN Application Gateway 2246 to the serial port of a terminal or PC using a DB-9 female, null-modem cable. See Figure 19.

Figure 19 Cable to port connection



2 Run a terminal emulation program (such as HyperTerminal™), or use a VT-100 terminal with the following configuration:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Note: If using Windows 2000, Service Pack 2 must be installed to enable the use of HyperTerminal™.

3 Reset the system.

The following appears on the terminal:

04830130

4 Type the following command using the terminal or PC keyboard:

0255CC [CTRL M] [CTRL J]

The command does not display on the screen as it is typed.

The login screen appears. If an error was made when entering the command string, the message "**Ill Formed Packet**" appears. It appears as a series of numbers followed by some form of the typed command. If this occurs, repeat Step 3 and Step 4.

5 Enter the default login name (**admin)** and the default password (**admin)**.

Note: The login name and password are case-sensitive.

The **NetLink OAI System** menu appears. See Figure 20 on page 88.

Figure 20 NetLink OAI System menu

The NetLink OAI System menu of the Administration Console displays the factory-default name of the WLAN Application Gateway 2246 to which the serial port is connected.

Note: If the WLAN Application Gateway 2246 is a MOG6xx model, the TFTP Server Download Configuration option appears on the NetLink OAI System menu.

Configuring the WLAN Application Gateway 2246

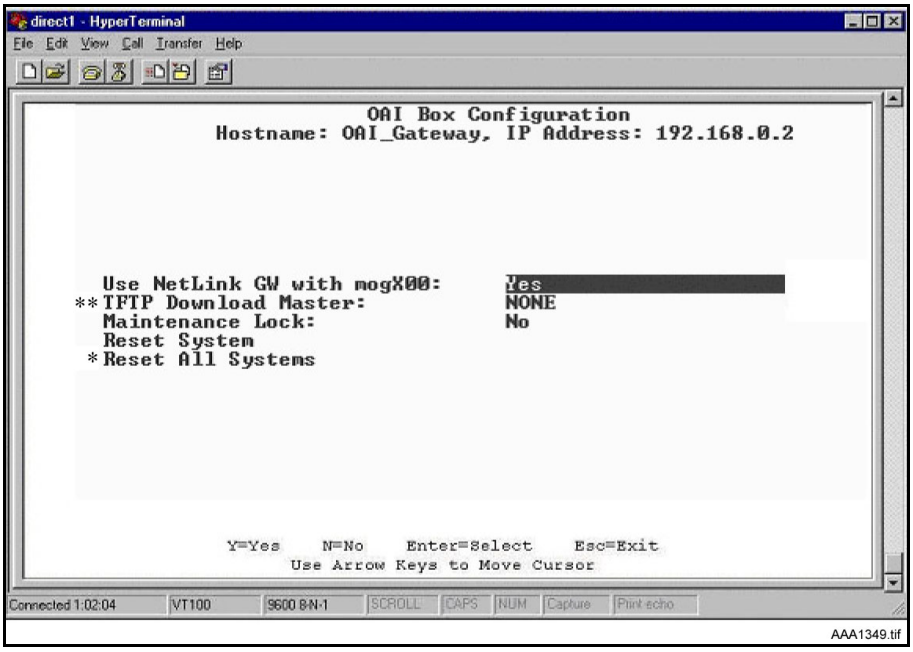
The **NetLink OAI System** menu is the main menu of the Administration Console. Use this screen to configure the WLAN Application Gateway 2246.

Configuring the OAI Box

1 Select **OAI Box Configuration f**rom the **NetLink OAI System** menu.

The **OAI Box Configuration** screen appears (see Figure 21 on page 89).

Figure 21 OAI Box Configuration screen



Note 1: ** – Option appears only on the MOG6xx model.

Note 2: * – This option does not appear unless “Use NetLink GW with mogX00” is set to “Yes”, as it is in this screen, which is the default.

2 Configure the following fields with information provided by the network administrator:

- **Use NetLink GW with mogX00** – change this option to **No**.
- **TFTP Download Master** – enter the IP address of the TFTP Server.
- **Maintenance Lock** – the system sets this option to **Yes** after maintenance activities have been performed that require a reset. This option cannot be changed. It is automatically set. Reset the system at exit to clear Maintenance Lock. Maintenance Lock prevents any new calls from starting.
- **Reset System** – if this option is set to **Yes**, the WLAN Application Gateway 2246 is reset after pressing **ENTER**.
- **Reset All Systems** – not applicable.

3 Press **Esc** on the keyboard to return to the **NetLink OAI System** menu.

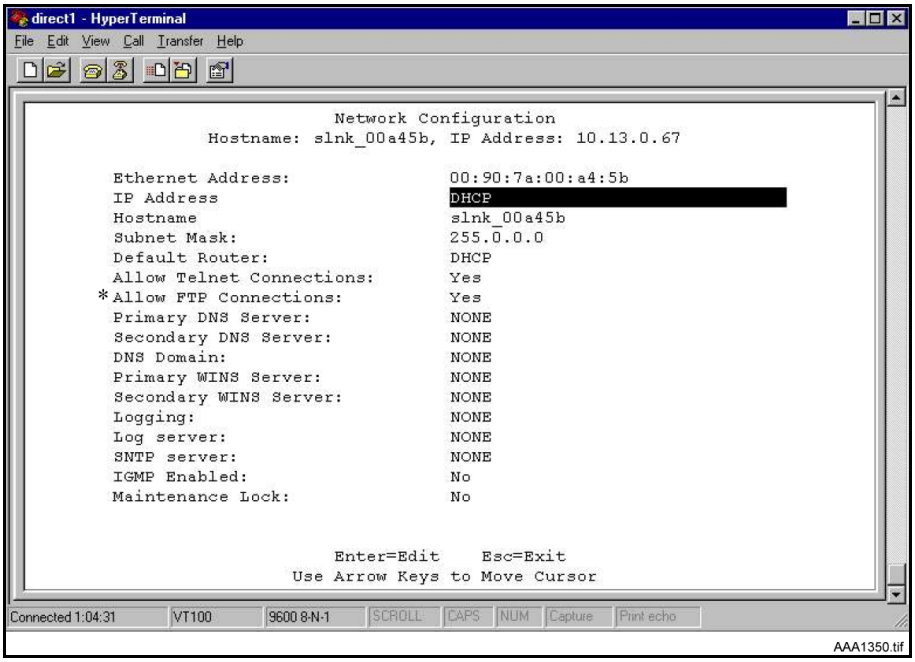
Configuring the network

1 Select **Network Configuration** from the **NetLink OAI System** menu.

The **Network Configuration** screen appears (see Figure 22).

Note: * - The **Allow FTP Connections** option appears only for MOG7xx models.

Figure 22 Network Configuration screen



2 Configure the following fields with information provided by the network administrator:

- **Ethernet Address** – this is the MAC address of the WLAN Application Gateway 2246. This address is set at the factory.
- **IP Address** – enter the complete IP address for the WLAN Application Gateway 2246, including digits and periods. Do not use DHCP. The IP address can be changed after initial configuration.
- **Hostname** – the default host name can be changed. This is the name of the WLAN Application Gateway 2246 to which connection has been made. This name is for identification purposes only. Spaces cannot be entered in this field.
- **Subnet Mask** – Enter the subnet mask defined by the network administrator.
- **Default Router** – DHCP or static IP address.
- **Allow Telnet Connections** – Enter **Y** (Yes) to allow connection to the WLAN Application Gateway 2246 through Telnet. Enter **N** (No) if no Telnet connection is allowed.
- **Allow FTP Connections** – Yes/No (MOG 7xx only).

- **DNS server and DNS domain** – these settings are used to configure DNSs. (These settings can also be configured as DHCP. This causes the DHCP client in the WLAN Application Gateway 2246 to attempt to automatically obtain the correct configuration from the DHCP server. The DHCP setting is only valid when the IP address is also acquired using DHCP).
- **WINS servers** – these settings are used for Windows Internet Name Services (WINS). (These settings can also be configured as DHCP. This causes the DHCP client in the WLAN Application Gateway 2246 to attempt to automatically obtain the correct setting from the DHCP server. The DHCP setting is only valid when the IP address is also acquired using DHCP. When WINS is configured properly, the WLAN Application Gateway 2246 can translate hostnames to IP addresses. When using Telnet, it is also possible to access the WLAN Application Gateway 2246 using its hostname instead of the IP address.
- **Logging** – Logging can be set to **Syslog** or **NONE**.
- **Log server** – enter the IP address or hostname of the Syslog server on the network if Syslog has been configured. The WLAN Application Gateway 2246 writes Syslog format diagnostic messages to the Syslog server.
- **SNTP server** – can be configured as a hostname, IP address, or NONE. The SNTP server is a Simple Network Time server. The WLAN Application Gateway 2246 obtains the current date and time from the SNTP server and tags syslog messages with the date.
- **IGMP Enabled** – configure as **Yes** or **No**. IGMP is Internet Group Routing Protocol. **IGMP Enabled** allows the WLAN Application Gateway 2246 to join multicast groups. Enable this option if the network switch connected to the WLAN Application Gateway 2246 requires IGMP for multicast traffic to be forwarded.
- **Maintenance Lock** – the system sets this option to **Yes** after maintenance activities have been performed that require a reset. This option cannot be changed. It is automatically set. Reset the system at exit to clear Maintenance Lock. Maintenance Lock prevents any new calls from starting.

3 Press **ESC** to return to the **NetLink OAI System** menu.

4 Reset the WLAN Application Gateway 2246.

Continuing configuration through Telnet

Once the IP address for the WLAN Application Gateway 2246 has been configured and reset, and the WLAN Application Gateway 2246 has been connected to the LAN and the Application Server, Telnet can be used to continue the configuration of the WLAN Application Gateway 2246.

Connecting through Telnet

Connection to the WLAN Application Gateway 2246 can be done through the network using Telnet. Telnet can only be used after the IP address of the WLAN Application Gateway 2246 has been configured.

The Telnet method of connection is used for routine maintenance of the system for both local and remote administration, depending on the network.

Follow the steps to connect to a WLAN Application Gateway 2246 through Telnet.

Connecting to a WLAN Application Gateway 2246 through Telnet:

1 Run a Telnet session to the IP address of the WLAN Application Gateway 2246.

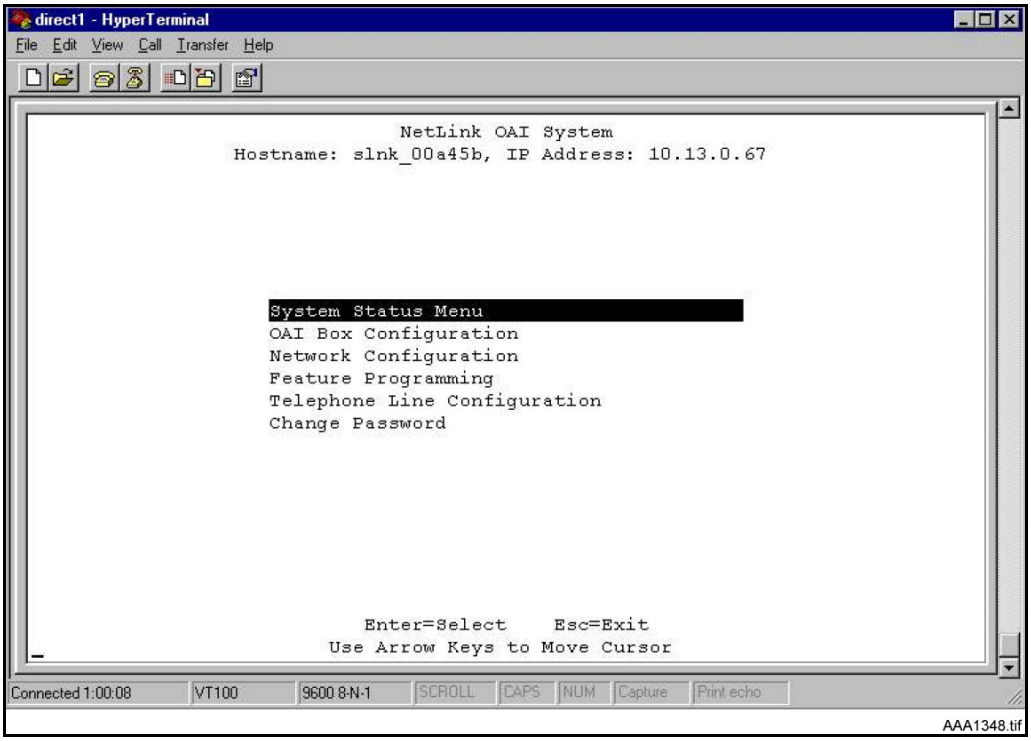
2 Log in to the WLAN Application Gateway 2246.

The **NetLink OAI System** screen appears.

Note: Since the WLAN Application Gateway 2246 has been initially configured, the **NetLink OAI System** screen now has some different options displayed.

When the configuration procedure is complete, the **NetLink OAI System** screen adds a **Feature Programming** option. Also, the OAI Line Configuration option is replaced by a **Telephone Line Configuration** option. See Figure 23.

Figure 23 NetLink OAI System screen with added options



Configuring the Telephone Line

Each WLAN Handset 2210/2211 that uses the application's features must be configured with its line number and MAC address. The name and extension number of the WLAN Handset 2210/2211 user can be entered. Obtain this information from the WLAN Handset 2210/2211 Planning Worksheet. See Planning Worksheet for WLAN Handsets 2210/2211 on page 106.

The WLAN Handsets 2210/2211 require special configuration. This can include configuring options on the DHCP server or on the WLAN Handset 2210/2211 to allow it to communicate with the WLAN Application Gateway 2246. Be sure these setting are correct. Refer to Configuring the WLAN Handsets 2210/2211 on page 60 for more information.

The system does not allow the same WLAN Handset 2210/2211 to register to two different lines. Use **Esc** to cancel any unwanted transaction.

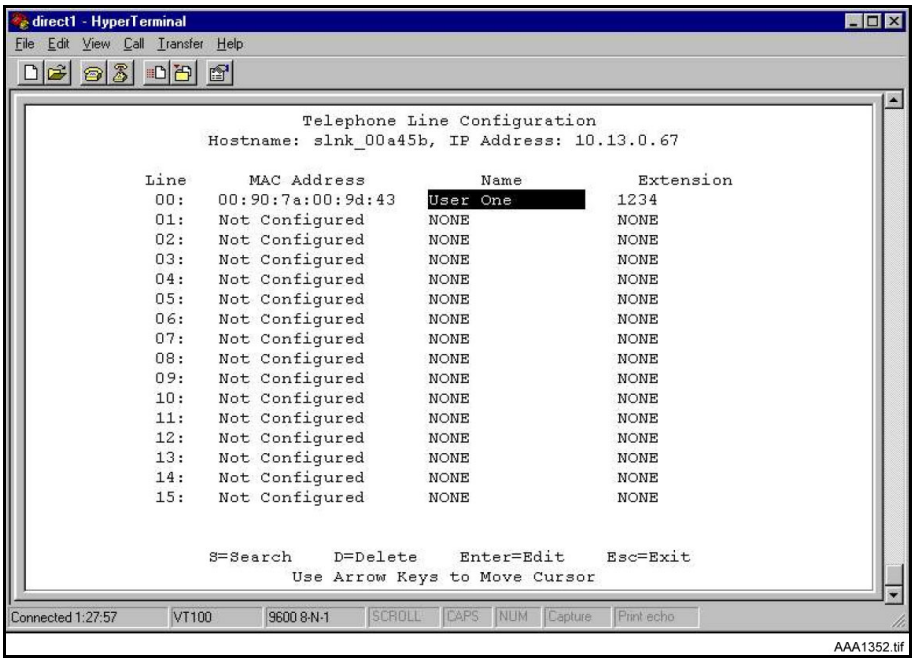
Follow the steps to configure the telephone lines for the application.

Configuring a telephone line:

1 From the **NetLink OAI System** screen, select **Telephone Line Configuration** and press **Enter**.

The **Telephone Line Configuration** screen appears. See Figure 24.

Figure 24 Telephone Line configuration



2 Use the arrow keys to navigate to the **Name** and **Extension** fields.

3 Enter the associated data for the wireless handsets.

- **MAC Address** – the MAC address is printed on the sticker underneath the battery on the WLAN Handsets 2210/2211. It can also be displayed on the WLAN Handsets 2210/2211 by turning off the wireless handset, and then pressing and holding the **Pwr** (power) button. The MAC address appears on the first line of the wireless handset display (12 characters). The MAC address must be manually entered by typing the entire address, including digits and colons.
- **Name** – enter the user name assigned to the wireless handset. This is for record keeping only; it does not communicate the name to the Call Server or the WLAN Handsets 2210/2211.
- **Extension** – enter the extension number assigned to the WLAN Handset 2210 or 2211. This is for record keeping only; it does not communicate the extension number to the Call Server or the WLAN Handsets 2210/2211.

4 Write the MAC address on the Wireless Handset Planning Worksheet. See Planning Worksheet for WLAN Handsets 2210/2211 on page 106.

5 Repeat Step 2, Step 3, and Step 4 for each wireless handset to be added or changed.

6 Press **Esc** to return to the **NetLink OAI System** screen.

Deleting a WLAN Handset 2210 or 2211

Follow the steps to delete a WLAN IP Telephony Manager.

Perform the following steps to delete a WLAN Handset 2210/2211.

1 From the **NetLink OAI System** screen, select **Telephone Line Configuration** and press **Enter**.

The **Telephone Line Configuration** screen appears.

2 Use the arrow keys to highlight the line to be deleted.

3 Press **D** to delete the WLAN Handset 2210 or 2211 information.

4 Press **Y** to accept changes.

5 Press **Esc** to return to the **NetLink OAI System** screen.

Searching for a WLAN Handset 2210/2211

While in the Telephone Line Configuration or the Telephone Line Status screens, a search hotkey is available.

Follow the steps to search for a WLAN Handset 2210/2211.

Searching for a WLAN Handset 2210/2211:

1 From the **NetLink OAI System** screen, select **Telephone Line Configuration** and press **Enter**.

   The **Telephone Line Configuration** screen appears.

2 Select the field to use as the search key (**MAC Address**, **Name**, or **Extension**),

3 Press **S** to display a search screen dialog box.

4 Type an appropriate search string.

5 Press **Enter**.

   The success or failure of the search is displayed at the bottom of the screen.

6 Continue to change the search string for different search criteria or exit by pressing the **Esc** key.

The first line of the Telephone Line Configuration or Telephone Line Status screen displays the line in which the search match is found.

Successful searches always have the first found match at the top of the list.

Note: Partial strings match for beginnings of strings, (for example, a search for extension 10 matches extensions 10, 100, 1000, and so on, but will not match 010).

Programming a feature

The application function is accessed in the WLAN Handset 2210/2211 by pressing the FCN button plus a second button. The button used to access the application feature from the wireless handset is configured through the Feature Programming option.

Note: FCN 1-6 are hard-coded. If the application function is programmed to use FCN 1-6, the hard-coded function is overridden. Nortel Networks recommends using 7, 8, or 9 for the application function.

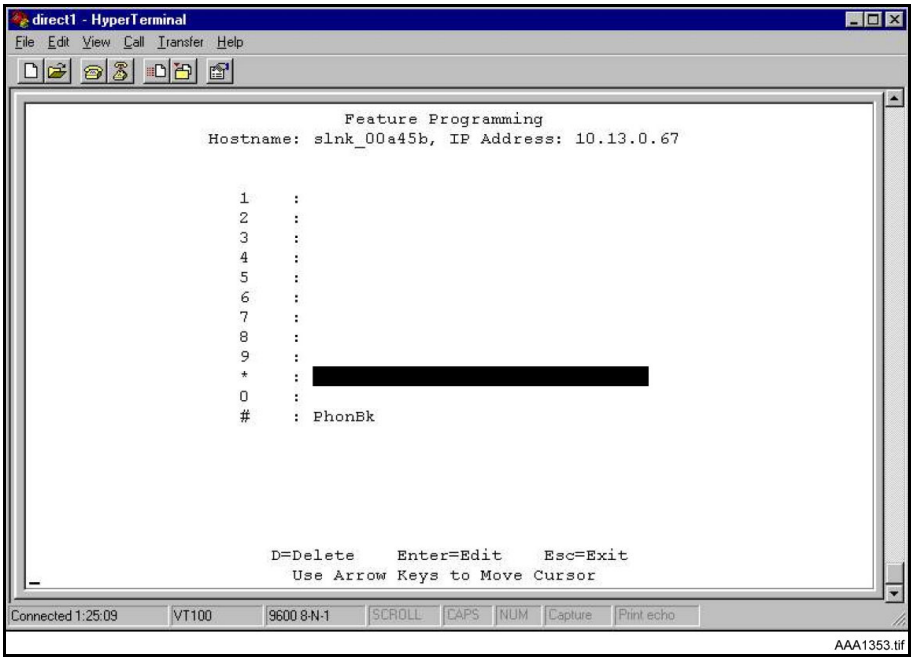
Follow the steps to program an application feature for the wireless handsets.

Perform the following steps to program a feature.

1 From the **NetLink OAI System** screen, select **Feature Programming** and press **Enter**.

   The **Feature Programming screen** appears. See Figure 25 on page 96.

Figure 25 Feature programming screen



2 Use the arrow keys to select the function number 7, 8, or 9 to associate with the application.

3 Type any label up to six characters.

What is typed here is displayed on the WLAN Handset 2210/2211 telephone display screen next to the assigned number on the FCN menu.

In Figure 25, the **FCN + #** key sequence displays **PhonBk** on the WLAN Handset 2210/2211 function menu. Figure 25 shows an application; in this case, a phone book enabling speed dialing to those listed.

Setting or changing a password

A unique password can be configured for the WLAN Application Gateway 2246. The password restricts access to the device's administrative functions.

Tip: Record the password and store it in a safe place. If the password is lost or forgotten, contact Nortel Networks Technical support.

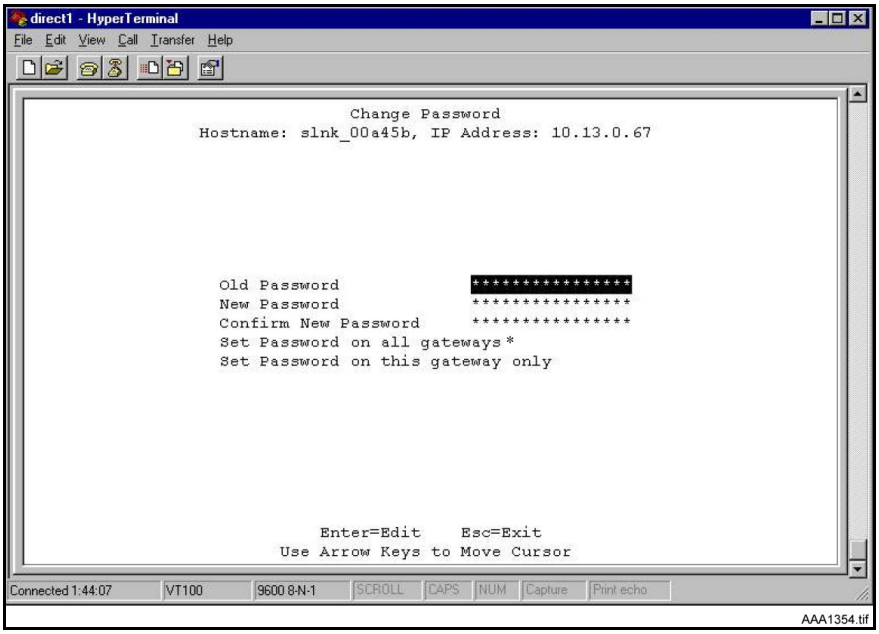
Follow the steps to configure or change a password on the WLAN Application Gateway 2246.

Setting or changing a password:

1 From the **NetLink OAI System** screen, select **Change Password** and press **Enter**.

The **Change Password** screen appears. See Figure 26 on page 97.

Figure 26 Change password



Note: * - not applicable.

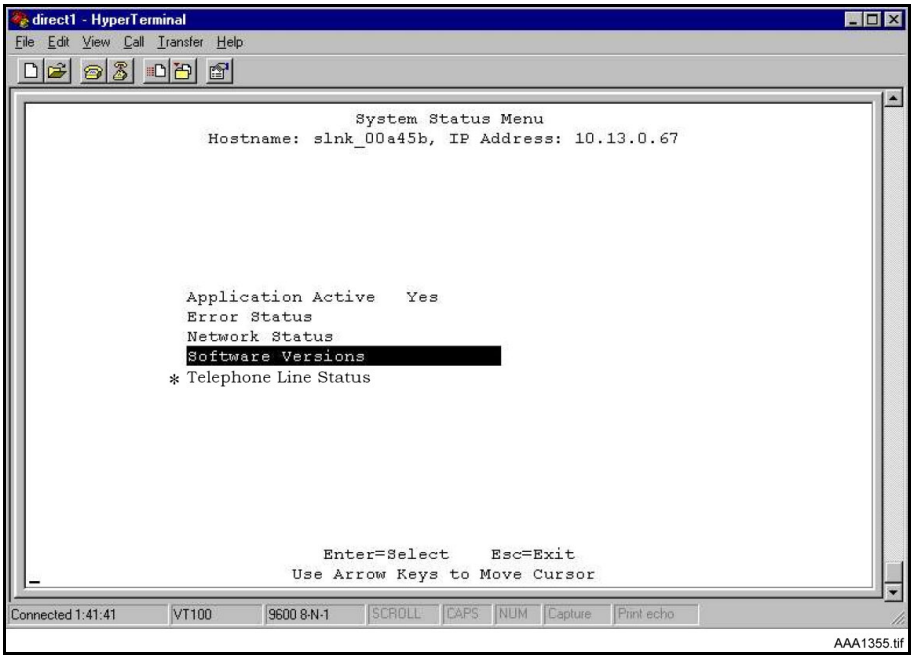
2 Use the default password **admin**.

3 Follow the prompts to configure a new password.

Viewing system status

To view the status of the system, select the **System Status Menu** option from the **NetLink OAI System** screen. The **Systems Status Menu** screen appears. See Figure 27 on page 98.

Figure 27 System Status Menu screen



The following options can be selected:

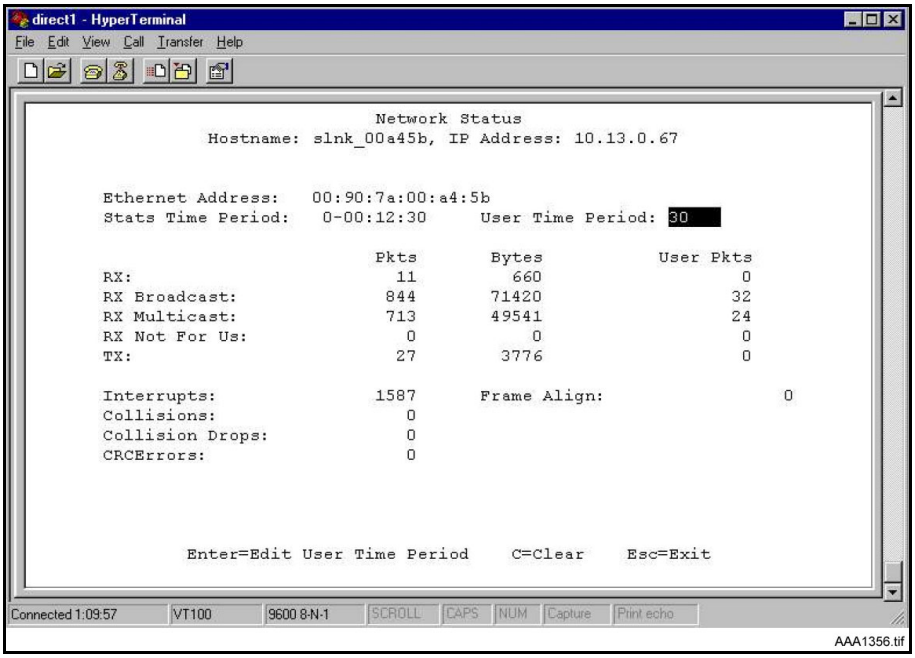
- **Application Active** – displays **Yes** when the application is communicating correctly with the WLAN Application Gateway 2246. Displays **No** when the application is not connected. This field is read-only and changes dynamically.
- **Error Status** –The only application-specific error is **No ECP heartbeat**, which means the application failed to send a heartbeat to the WLAN Application Gateway 2246.
- **Network Status** – information about the connection to the LAN. Refer to Viewing network status on page 98.
- **Software Versions** – lists the software versions currently running on the WLAN Application Gateway 2246. Refer to Viewing software versions on page 101.
- *** Telephone Line Status** – information about the functioning of each wireless handset registered to the WLAN Application Gateway 2246. Refer to Viewing Telephone Line Status on page 100.

Viewing network status

The WLAN Application Gateway 2246 is connected to the Ethernet network, referred to as the LAN. The information about this connection displayed on the **Network Status** screen.

From the **System Status Menu** screen, select **Network Status**. The **Network Status** screen displays information about the Ethernet network. This information can help troubleshoot network problems. See Figure 28 on page 99.

Figure 28 Network Status



The following information is displayed at the top of the screen:

- **Ethernet Address** – MAC address of the WLAN Application Gateway 2246 (hexadecimal).
- **Stats Time Period** – the length of time the statistics have been accumulating in the **Pkts** and **Bytes** columns. This is either the system uptime, or the time that has elapsed since a user pressed **C=Clear** while viewing this display.
- **User Time Period** – the length of time (in seconds) that statistics accumulate in the **Userpkts** column before resetting to zero. When troubleshooting a problem, use this setting to isolate statistics for a given time period (for example, one hour). This is the only field in this screen that can be changed by the user.

The rest of the display is a table of Ethernet statistics. The **Pkts** and **User Pkts** columns list the count of Ethernet packets received or transmitted. The **Bytes** column is the count of bytes received or transmitted during the amount of time indicated by the **Stats Time Period**.

- **RX** – number of packets and bytes received addressed to the WLAN Application Gateway 2246.
- **RX Broadcast** – the number of broadcast packets and bytes received.
- **RX Multicast** – the number of packets and bytes received with the multicast address. (A “multicast” message is sent to more than one destination on the network.)
- **RX Not For Us** – the number of multicast packets and bytes received that were not for the WLAN Application Gateway 2246.
- **TX** – the total number of packets and bytes transmitted.
- **Interrupts** – the number of times the Ethernet controller signals the microprocessor that it has received or sent a packet.

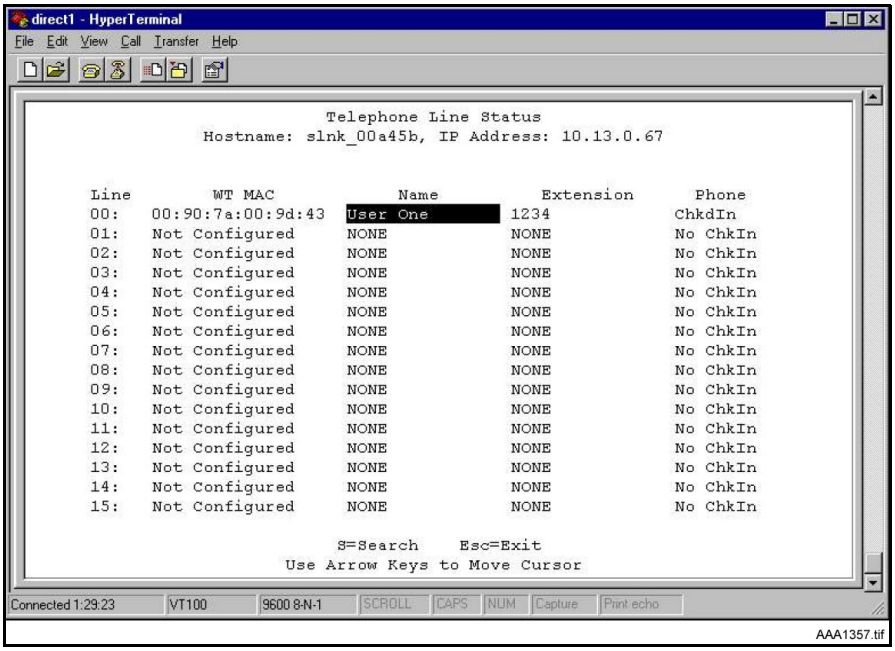
- **Collisions** – the number of times the Ethernet controller attempts to send a packet, but another device on the network transmitted at the same time, corrupting the transmission.
- **Collision Drops** – the number of packets the Ethernet controller discards, because there were over sixteen collisions. After sixteen collisions, the Ethernet controller hardware discards the current packet and attempts to send the next packet in its buffer.
- **CRC Errors** – the number of packets discarded by the Ethernet controller, because of a Cyclic Redundancy Check (CRC) error.

Viewing Telephone Line Status

The Telephone Line Status screen shows which wireless handsets are communicating with the WLAN Application Gateway 2246.

From the System Status Menu screen, select **Telephone Line Status**. The WLAN Application Gateway 2246 displays up to 16 telephone lines at one time. See Figure 29. Move to the next group of 16 lines by using the arrow keys.

Figure 29 Telephone Line Status screen



The following information is displayed on the **Telephone Line Status** screen:

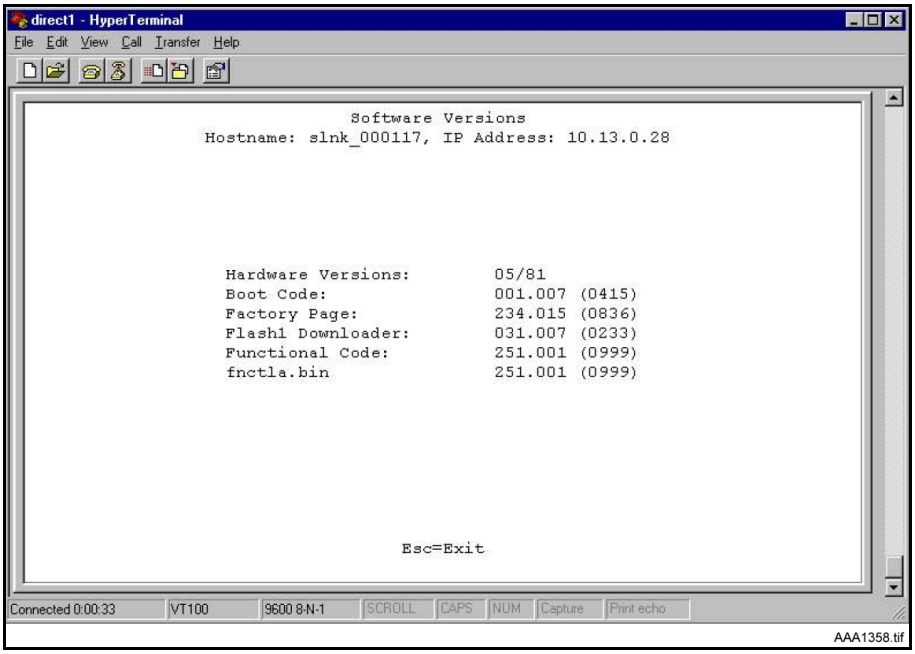
- **WT MAC** – the MAC address of the WLAN Handset 2210/2211 that was entered when the wireless handset was configured.
- **Name/Extension** – these fields contain the data entered at configuration.
- **Phone** – **No ChkIn** indicates the WLAN Handset 2210/2211 is not using the application function. **ChkIn** indicates the WLAN Handset 2210/2211 is communicating with the WLAN Application Gateway 2246.

Viewing software versions

Each WLAN Application Gateway 2246 and WLAN Handset 2210/2211 runs software that is controlled and maintained through versioning. The **Software Versions** screen provides information about the version currently running on the components. This information helps determine if the most recent version of software is running, and assists Nortel Networks Technical Support in troubleshooting software problems.

From the **System Status Menu** screen, select **Software Versions**. The **Software Versions** screen appears. See Figure 30.

Figure 30 Software Versions screen



Certification testing

WLAN Application Gateway 2246 certification

When the WLAN Application Gateway 2246 is properly connected to the Application Server, LED 1 blinks.

Wireless handset certification

WLAN Application Gateway 2246 installation on new system

If this is a new system installation, continue with WLAN Handset 2210/2211 registration and Call Server programming. When the wireless handset installation is complete, perform the usual voice and coverage tests.

WLAN Application Gateway 2246 installation on existing system

Follow the steps to certify the wireless handsets on an existing system.

Certifying the wireless handsets on an existing system

1. Place a test call.
2. Test the features on each WLAN Handset 2210/2211 to ensure the system is working properly.
3. Test the application on each WLAN Handset 2210/2211.
4. Consult the application provider for specific test procedures.

Updating software

The WLAN Application Gateway 2246 and the WLAN Handsets 2210/2211 use proprietary software programs. The software versions that are running on the system components can be displayed through the **System Status** screen.

> Nortel Networks provides information about software updates, and how to obtain the software (for example, downloading from the Nortel Networks web site).

Software updates on MOG700 systems

After software updates are obtained from Nortel Networks, they must be transferred to the appropriate location in the LAN. This enables the corresponding system components to access and update their software. The FTP (File Transfer Protocol) method of transfer is used.

In the WLAN Application Gateway 2246, the flash file system has the following files shown in Table 11:

Table 11 Software files

File name	Description
config.bin	OAI box configuration
fnctla.bin	functional code
oaiptlst.bin	phone list configuration
oaipttlsb.bin	redundant phone list configuration

The fnctla.bin file is upgraded periodically by Nortel Networks and is the only file downloaded. The other files are configuration files, and their names are provided for information and backup purposes.

Obtain software using FTP

When using FTP, a host system is used to connect to a remote system. In this example, the host is the client and the server is the WLAN Application Gateway 2246. The “put” command means to copy the files from the host to the remote system.

Note: FTP commands vary with the particular FTP program used. Use the following steps as a general guide, but be aware that an FTP program may use different terms to describe the procedure.

Follow the steps to transfer the software using FTP.

Transferring the software using FTP:

1 Navigate to the **OAI Box Configuration** screen and place the system in Maintenance Lock before proceeding with the FTP procedure.

Note: This prevents new calls from starting. No calls may be in progress during the FTP procedure.

2 Connect to the WLAN Application Gateway 2246 using the command: **FTP <hostname>** or **FTP <IP address>**.

3 Log in using the administrator login **admin** and password (default is **admin**).

Result: A login confirmation message appears, followed by the FTP> prompt.

4 At the FTP prompt, type **binary**.

Result: A confirmation message appears.

5 At the FTP prompt, use the **put** command to transfer the functional code file to the client server or WLAN Application Gateway 2246.

Rename the file before loading it into the WLAN Application Gateway 2246. The download file is named **MOG700.bin**. Rename the file **fnctla.bin**.
Example: put mog700.bin fnctla.bin

6 After files are transferred, use the **Quit** command to quit FTP.

7 Navigate to the **NetLink OAI System** screen for the WLAN Application Gateway 2246

8 Select **System Status**.

9 Select **Software Versions** to verify that software versions for the WLAN Application Gateway 2246 are correct.

10 Reset the system through the **OAI Box Configuration** screen in order to restore Maintenance Lock to “N”.

Note: A GUI FTP client can be utilized instead of the described command line FTP procedure.

TFTP software updates for MOG600 Systems

The WLAN Application Gateway 2246 uses proprietary software programs. The software versions running on the system components can be displayed through the **System Status** screen of the WLAN Application Gateway 2246.

Nortel Networks provides information about software updates and how to obtain the software (for example, downloading from the Nortel Networks web site).

Follow the steps to load software updates for MOG600 systems.

Loading software updates for MOG600 Systems:

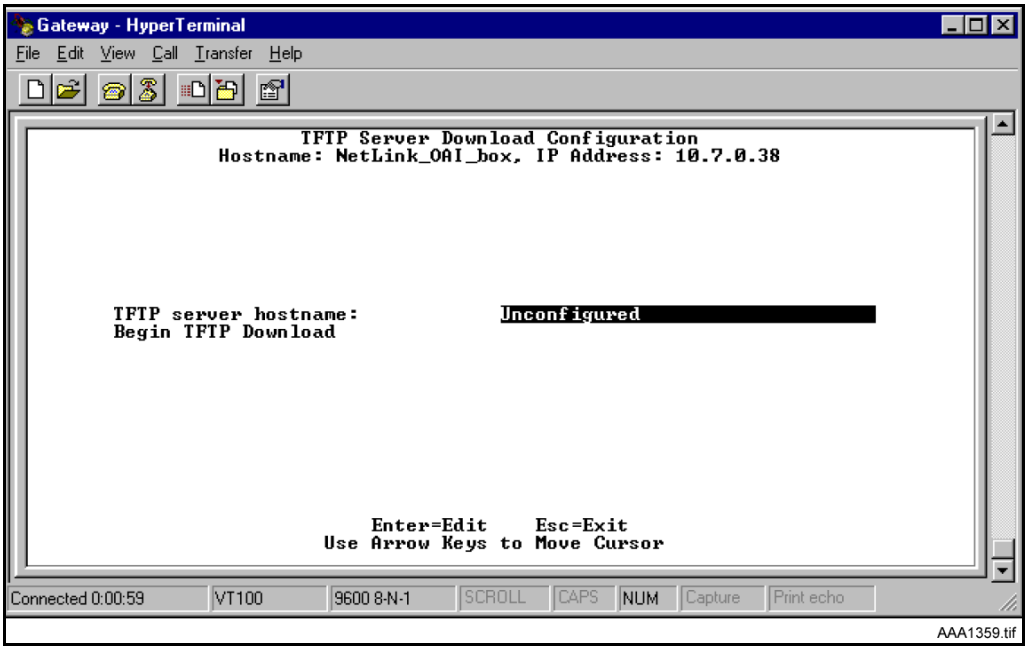
1 Install a TFTP Server on a LAN-connected system.

2 Consult the server vendor’s documentation for information about TFTP.

3 Once the software update is obtained from Nortel Networks, load the software in a location that is accessible by the TFTP program.

4 To configure the host and start the download, select the **TFTP Server Download Configuration** option from the **NetLink OAI System** screen. See Figure 31 on page 105.

Figure 31 TFTP Server Download Configuration screen



5 Enter the TFTP Server hostname.

6 Use the arrow keys to move the cursor to the **Begin TFTP Download** option.

7 Press **Enter** to begin the download.

The MOG600.bin code downloads into the WLAN Application Gateway 2246.

Planning Worksheet for WLAN Handsets 2210/2211

Copy and complete the worksheet in Table 12 to track parameters for each WLAN Handset 2210/2211.

Table 12 WLAN Handset 2210/2211 Planning Worksheet

OAI Port	MAC Address	User Name	Dialing Ext.	IP Address (if static)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Freeing the serial port for administrative purposes

If the serial port is being used as the primary communication link with the Application Server, it is necessary to enter the OAI command to free the serial port so that it can be used for administrative purposes, such as changing the IP address of the WLAN Application Gateway 2246.

After configuring the WLAN Application Gateway 2246, perform the following steps to again use the serial port as the communication link with the Application Server.

1. Disconnect the terminal or PC from the serial port on the WLAN Application Gateway 2246.
2. Reconnect the communication cable between the WLAN Application Gateway 2246 and the Application Server.
3. Reset the system.

Normal communication between the Application Server and WLAN Application Gateway 2246 commences.

Appendix C: Testing the WLAN Handsets 2210/2211

Introduction

Verify proper registration and operation of each wireless handset by performing the following tests on each wireless handset in an active wireless area.

Testing calls and features

1. Power on the WLAN handset by pressing **Power On/Start Call**.

   A series of messages display as the WLAN handset accesses the system. The WLAN handset displays the user extension or displays dashes if no extension is programmed. Any error messages clear.

2. Press the **Power On/Start Call** key.

   The extension number is replaced by information from the BCM and dial tone is heard.

3. Place a call and listen to the audio quality.

   End the call by pressing the **Power Off/End Call** key.

4. Place a call to the WLAN handset and verify ring, answer, clear transmit, and clear receive audio.

5. Use the **FCN** key to verify all programmed features on the WLAN handset.

6. Press the **Power On/Start Call** key.

   Any line indicators turn off and the extension number display returns.

Testing signal strength with the WLAN handsets

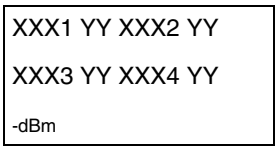
1. Test signal strength in the covered area by putting a WLAN Handset 2210/2211 in Site Survey Mode.

   Refer to “Site Survey mode” on page 113.

2. Walk the entire coverage area while viewing the display.

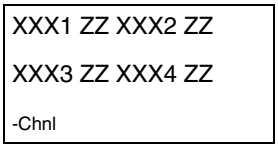
   The **FCN** key toggles between three coverage modes:

- **Detect dBm coverage** – Press FCN to toggle to the Site Survey function that shows the top four APs. Walk the perimeter of the site. The two-line display on the wireless handset shows the top four APs that the wireless handset can contact. The information is shown in code as follows.



  — XXX1 through XXX4 are the last four digits of the MAC address of the APs. The primary AP (the AP that had the strongest signal to this wireless handset) appears first, followed by the three APs with the next strongest signals.
  — YY is the power level in dBm at which this wireless handset heard the associated AP. Although shown as a positive number, YY represents negative dBm. Lower numbers represent stronger signals. For example, a displayed value of 40 indicates –40dBm, and is a stronger signal than a display of 50 (which indicates –50dBm). At least one AP should have a reading stronger than –70 dBm in all areas.

- **Detect overlap or conflicts** – Press **FCN** to toggle to the **Chnl** function that shows the channel number of the APs. Use this information to detect overlaps or conflicts in AP signaling.

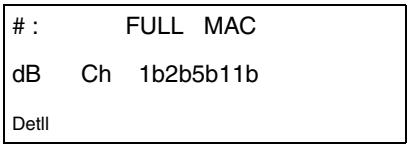


  — XXX1 through XXX4 are the last four digits of the MAC address of the APs.
  — ZZ is the channel number that the AP is using.

  Make note of any areas that have APs that are in contention for the same channel.

  It is preferable that no overlaps exist anywhere in the site. If the Site Survey mode indicates two APs using the same channel, then at least one other AP must be at least 10 dBm stronger than the other two APs to prevent channel conflicts.

- **Confirm supported data rates** – Press **FCN** to toggle to the **Detl** function which shows details of the specific AP. Use this information to confirm signal strength and supported data rates.



  — # is the number (1 – 4) of the AP
  — Full MAC is the MAC address of the AP

— dB is the signal strength of the AP

— **Ch** is the channel of the AP

— 1b2b5b11b is an example of the data rate that may be displayed

Walk around the site to determine supported data rates, one AP at a time. In any location, use the right arrow key to display the second best AP. Use the right arrow key again to display the third best, and then the fourth best. The left arrow key returns the display back to the first best AP.

Each data rate (1, 2, 5.5, or 11Mbit/s) supported by the AP is shown. The rates that are in the Basic Rate set (sometimes referred to as “required” rates) are indicated by a ‘b’ following the rate number. The Supported and Basic data rates should be the same on all APs and as is appropriate for the site.

Note: The wireless handset remains in Site Survey mode until it is powered off.

3 When testing is complete, press **Power Off/End Call** to power off the wireless handset.

Note: Numbers racing across the wireless handset display indicate AP information is being obtained. A **Waiting** message indicates the system is not configured properly and the wireless handset cannot find any APs.

Appendix D: Provisioning

Site survey

To conduct a site survey, set up an AP at a particular location. Use a computer equipped with a WLAN device and site survey software or a WLAN Handset 2210/2211 operating in Site Survey mode to measure the strength of the signal from the AP. Move the wireless device around and repeat the measurements to determine the optimum number and best locations for the APs. This method helps identify dead zones and areas where building materials or other factors affect the performance of the network.

Site Survey mode

Site Survey mode is used to check the signal strength from APs. When you select Site Survey mode, the WLAN Handsets 2210/2211 remain in this mode until they are powered off. During configuration, press the right arrow to skip this mode.

The WLAN Handsets 2210/2211 Site Survey mode displays *negative* dBm levels. These levels represent the strength of the received signal (Received Signal Strength Indication [RSSI]) from an AP. The RSSI information aids in determining if WLAN coverage is adequate.

For information on using the Site Survey mode, refer to "Appendix C: Testing the WLAN Handsets 2210/2211" on page 109.

Note: The WLAN Handsets 2210/2211 do not require connectivity to a WLAN IP Telephony Manager 2245 or the BCM to enable the Site Survey mode to be used. The minimum configuration required is the ESSID of the WLAN or test AP and the WEP keys, if applicable.

Site certification

Ensure the wireless handsets are adequately supported by the site.

Conduct a site survey. Note any areas where coverage is conflicting or inadequate. Note any system difficulties and work with the system administrator to determine the cause and possible remedy. Refer to "Conducting an effective site survey" on page 114 for information on conducting a site survey.

The testing must be performed in typical operating conditions, especially if heavy loads occur. Generally, organize the test according to area and volume, placing numerous calls to others who can listen while coverage tests are performed. Note any areas with excessive static or clarity problems and report it.

Conducting an effective site survey

Consider the following points for an effective site survey.

Network usage

Examine the network usage:

- How many people will be using a wireless handset?
- What areas of the site require wireless handset access?
- How many hours each day will wireless handsets be in use?
- Which locations are likely to generate the largest amount of traffic?
- Where is future network expansion most likely?

Mobility requirements

Assess the mobility requirements:

- How many wireless handset users are in motion continually, such as in a warehouse or hospital?
- How many users work from different fixed locations throughout the site?

Physical site study

Perform a study of the physical site:

- Study blueprints of the proposed site. A site blueprint provides a map of the site, including the location of objects such as walls, partitions, and anything else that could affect the performance of a wireless handset. This helps identify areas where wireless handsets are less likely to perform well. Many obstructions are not readily visible and, in some cases, a room originally built for a specific purpose, such as a radiology lab, might have been converted into something completely different, such as a conference room. The blueprint may also show areas proposed for future building expansion.
- Mark possible wireless handset usage locations on the blueprint and refer to the marked blueprint during the physical walk-through and survey.

Walk-through and survey

Conduct a physical walk-through and survey:

- Document any items or materials near a proposed AP location that might interfere with reception or transmission and affect wireless handset performance, such as metal shelving.
- Document stock and inventory levels, current environmental conditions, and any materials that may interfere with wireless handset transmissions.

RF transmission testing

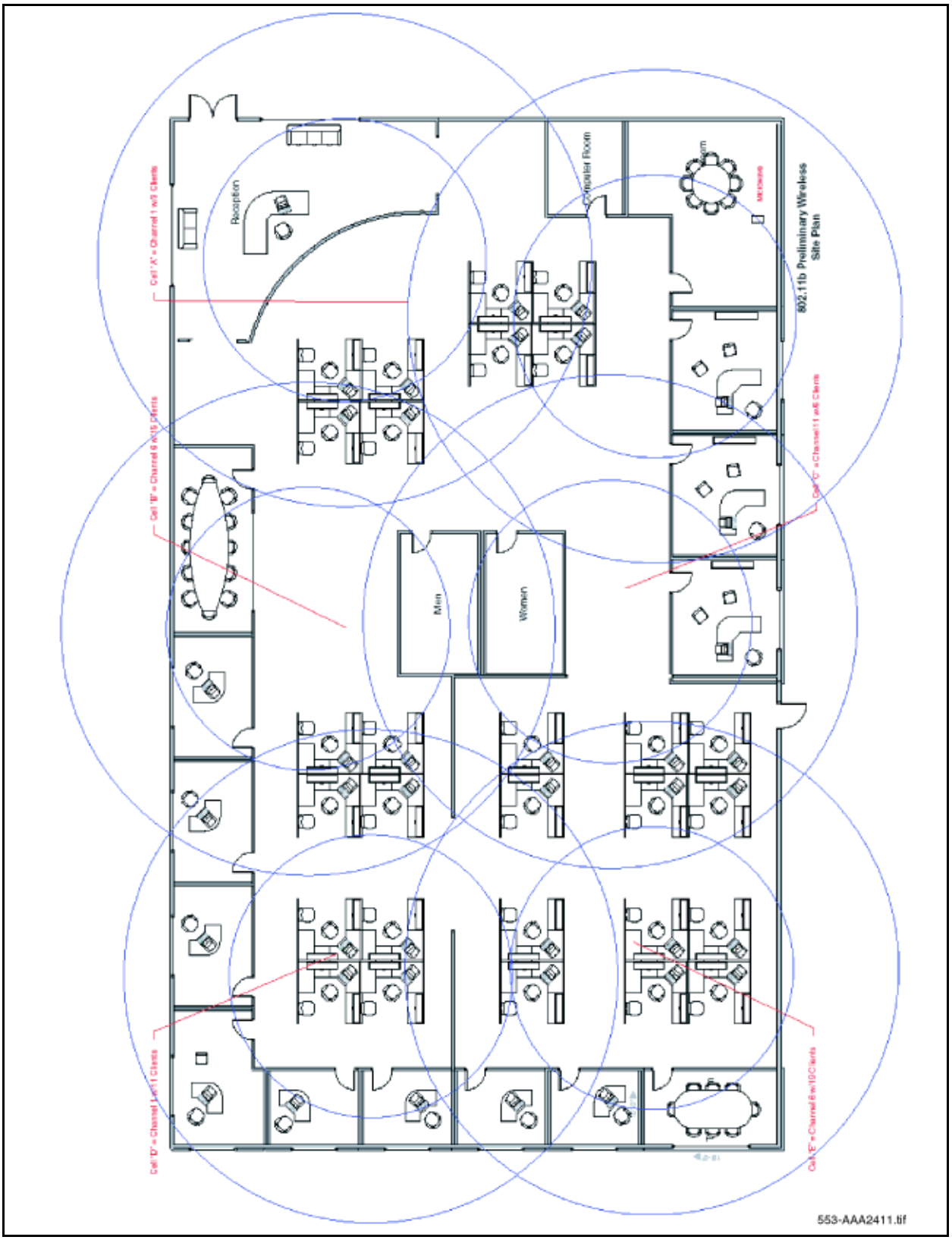
Once the APs have been installed and configured, it is necessary to measure the strength of the RF transmissions. Signal strength testing ensures that all usage areas have adequate coverage. This can be performed in two ways.

- Use the WLAN Handsets 2210/2211 to determine AP signal strength using the Site Survey mode.
- Use two portable computers with wireless hardware operating on a point-to-point basis. Using diagnostic software provided by the AP vendor, a coverage area for a potential AP can be determined by keeping one portable computer in one place and moving around with the other computer. Check with the vendor as to what tools are provided and what approach is recommended for deploying their APs.

Example of AP placement

Figure 32 on page 116 shows an example of an AP placement diagram.

Figure 32 Sample AP placement diagram



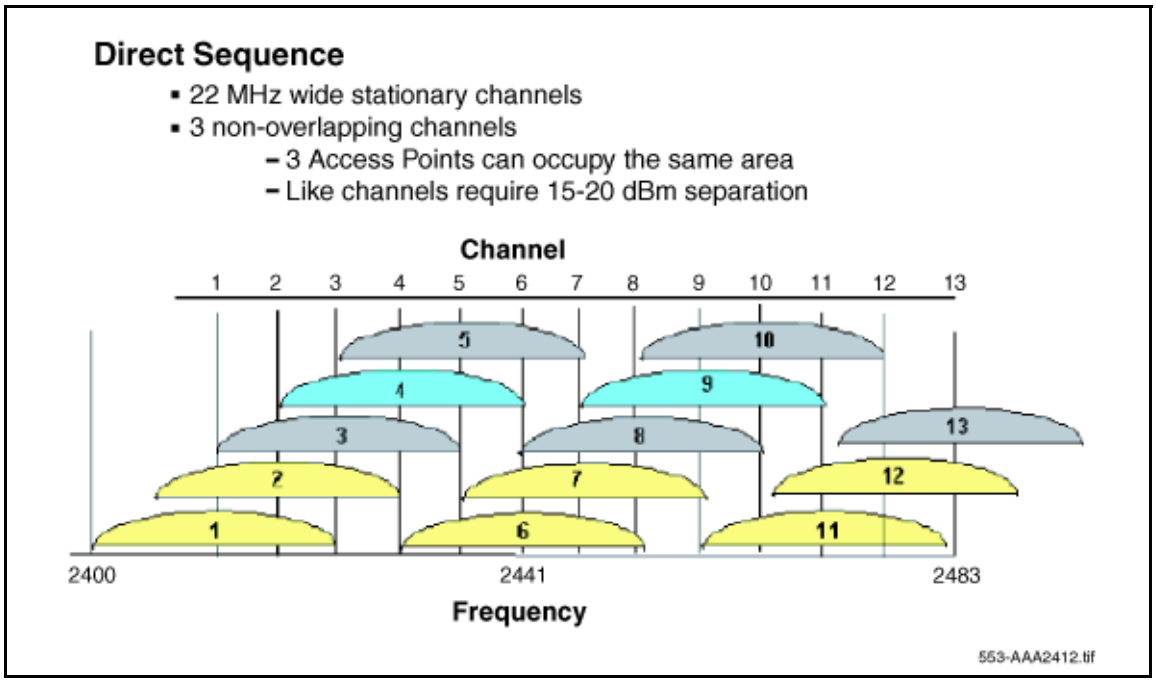
Solving coverage issues

Resolve coverage issues by adding or relocating APs or both.

Solving overlap issues

Resolve overlap issues by reassigning channels to the APs or by relocating the APs. Like channels require 15–20 dBm separation. See Figure 33.

Figure 33 Channel assignment



Note: Refer to the AP vendor documentation for more information on overlap.

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